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NORTH SEA PILOT

PART III.

1882.


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Official Copy.

NORTH SEA PILOT.

PART III.

EAST COAST OF ENGLAND.

BEING THE RESULT OF VARIOUS SURVEYS MADE BY ORDER OF THE LORDS COMMISSIONERS OF THE ADMIRALTY, TO 1881.

FOURTH EDITION.



PUBLISHED BY ORDER OF THE LORDS COMMISSIONERS OF THE ADMIRALTY.

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TO

THE FOURTH EDITION.

THE North Sea Pilot, Part III., contains Sailing Directions for the East Coast of England from Berwick to the North Foreland, including the Estuary of the Thames. The work was originally prepared in 1857 by Staff Commander E. K. Calver, R.N., who had been employed on the survey of this coast from the year 1836.

Materials for the directions from the North Foreland to the Nore were furnished by Commander E. Burstal, R.N., who was for many years employed in the survey of the River Thames and its approaches.

The present edition has been revised and corrected by Mr. E. C. Davison, R.N., from the latest Admiralty surveys, and from information furnished by the several local authorities.

Seamen are invited to transmit to the Secretary of the Admiralty notices of any errors or omissions they may detect in this work.

F. J. F.

Hydrographic Office, Admiralty London,
April 1882.

Q 6062. Wts. 585 & 828.

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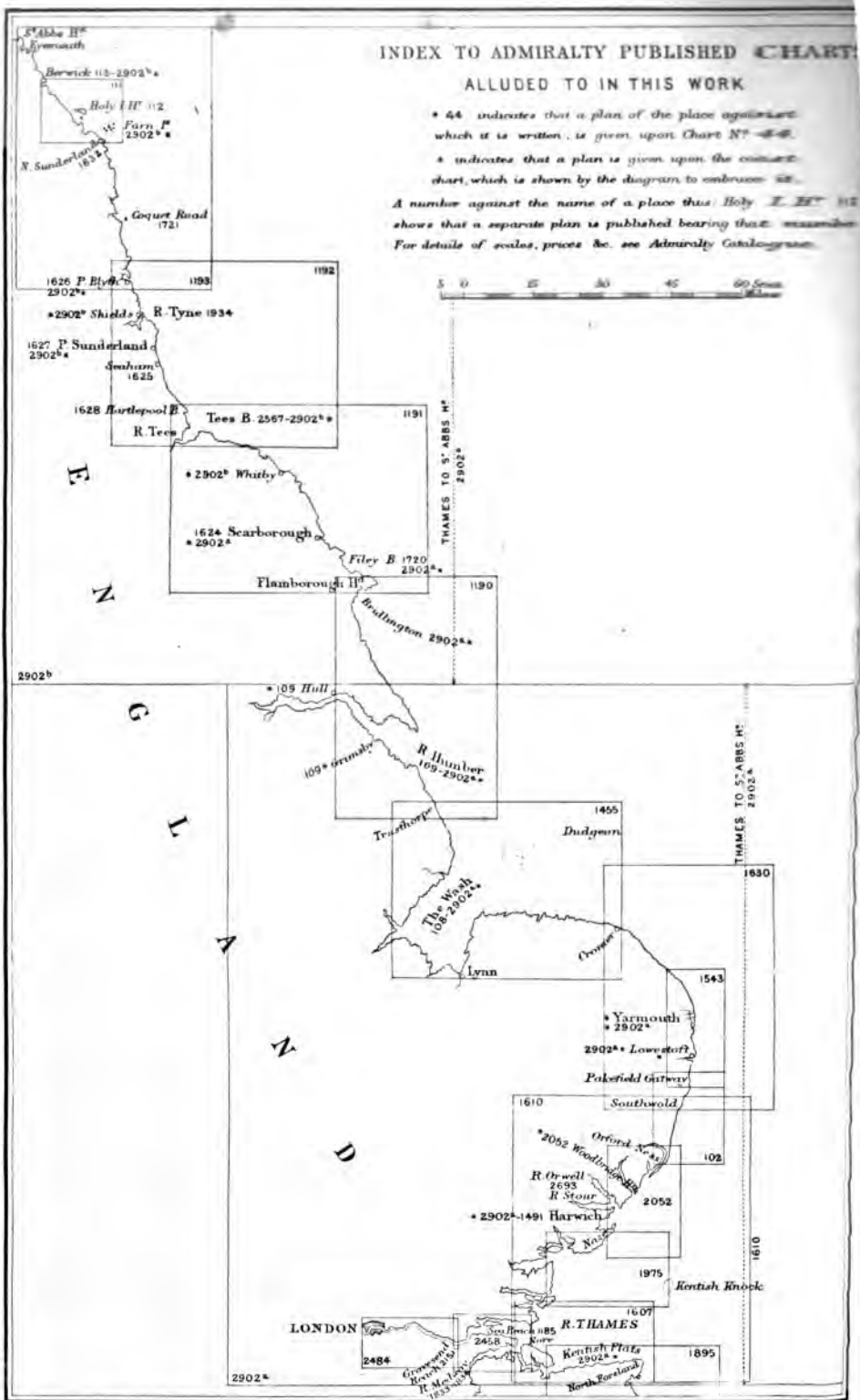
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IN THIS WORK THE BEARINGS ARE ALL MAGNETIC EXCEPT WHERE MARKED AS TRUE.

THE DISTANCES ARE EXPRESSED IN SEA MILES OF 60 TO A DEGREE OF LATITUDE.

A CABLE'S LENGTH IS ASSUMED TO BE EQUAL TO 100 FATHOMS.



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NORTH SEA PILOT.

PART III.

EAST COAST OF ENGLAND.

CHAPTER I.

BERWICK TO NORTH SUNDERLAND, WITH THE FARN ISLANDS.*

VARIATION, from 20° 21′ to 19° 50′ West in 1882.

Before proceeding with the outlying dangers in Berwick bay, and the directions for Holy island and to the southward, a general description of the coast will assist in rendering them more intelligible, and the leading marks employed will be more easily recognized.

COAST to the SOUTHWARD of BERWICK.—The principal objects on the coast immediately to the southward of Berwick are, Sunnyside hill (284 feet), to the south-west of Spittal, Berwick hill colliery, the three Scremerston steam mills (233 feet), Cheswick windmill, Brock mill, and Haggerston castle. On the shore a broad beach prevails to as far as Huds head; thence to Cheswick the shore is generally rocky, with a narrow band of sunken rocks, and the coast rises into a series of cliffs, which at Maidenkirk point are 87 feet high; from Cheswick southward is a sandy strand which gradually widens, until at Beal point it connects Holy island with the main at low-water, and forms the extensive tract of sand known as Fenham flats.

Low Lin is a small mansion 2 miles inland from Beal point, having trees near it which are used as a leading-mark; it stands on a high green hill, one mile to the northward of Kyloe church. Between Low Lin and Beal point stands the village of Beal on a rising ground, with trees to the northward and eastward.

Kyloe Hills, which rise about 2 miles from Fenham flats, are barren; they have been given distinguishing names by the pilots and fishermen, such as the Scores, Wingate Gap, Laws, &c. Wingate Gap appears as a long curve between the northernmost hill and the next to it; the Scores are two notches in the same ridge, a little to the southward of

* *See* Admiralty charts of east coast of England, R. Thames to St. Abbs head, 2 sheets, No. 2,902 *a*, *b*; scale, mile = 0·17 inch: Hartlepool to St. Abbs head, with views, No. 1,192; scale, mile = 0·5 inch: also, Farn islands to Berwick, with plan of Holy island harbour, and views, No. 111; scale, mile = 1·95 inch.

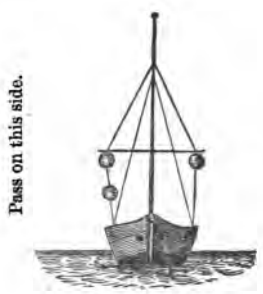
Wingate Gap; and the Laws appears as a long hill, having a hollow near its centre. Kyloe church is half a mile to the north-west of the village, which may be known by a cluster of trees called Kyloe trees. When seen from a position to the northward of Holy island, Kyloe church appears below the ridge, and is thus partially obscured by the background, but from eastward of the Longstone it is clearly seen near the declivity of the northern uncultivated hill.

FENHAM FLATS, extending 3 miles in length from Beal point to Old Law, by 2 miles in breadth, are traversed by a small rivulet which finds its way to sea through a "low," or depression in the sands; they are passable for foot passengers in certain directions when the tide is out, but are entirely covered at high-water. From Beal point to Snook point, the western extremity of Holy island, the distance is 1,200 yards, and this part is generally fordable for nine hours out of the twelve. Near Fenham granary, on the western side of the flats, small vessels may approach at high-water, and take the ground with safety.

Old Law, a narrow sandy islet three-quarters of a mile long, is separated from the main-land at Ross Links by a gap at its south end 300 yards in width, called the Wide Open, which admits the water of spring tides. On the northern extremity of the Old Law are two beacons 122 yards apart, which, kept in line, bearing W. by N., form the leading-mark over the bar of Holy island harbour. These beacons are of the same form (*see* view, page 13), being obelisks of brick painted *red*; the eastern is 77 feet, and the western 102 feet high above the level of high-water. Within 2 cables to the N.N.E. from these beacons is a small islet of gravel, called Black Law, which also serves as a mark; it is connected with the Old Law at low-water.

Life-Boat.—Near the southern end of the Old Law is a life-boat, and a house for the same.

WRECK MARKING VESSELS.—When light-vessels or other craft are placed to mark the position of wrecks they will be distinguished as follows, in order that mariners may learn on which side of them they should go:—



Vessels marking wrecks will have their top sides coloured green, and will exhibit—

By day—Three balls from a yard, 20 feet above the sea; two placed vertically on the side that shipping may safely pass, and one on the other side.

By night—Three *fixed white* lights, similarly arranged, but the ordinary riding light will not be shown.

Mariners will thus know on sighting a wreck-marking vessel that she is so employed; and that they should pass on that side of her on which the two balls or two lights are shown. *Notice to Mariners, No.* 37 *of* 1879.

Ross Links, a sandy ridge covered with bents, or long grass, extends 1¼ mile to the southward; abreast it is the anchorage called Skate road where vessels may bring up in westerly winds, to wait tide, in from 5 to 8 fathoms at low-water, with Farn high lighthouse bearing S.E. *See* page 23.

WARNHAM FLATS, or Waren flats, immediately to the southward of Ross Links, dry for an extent of one square mile at low-water; they are traversed by two streamlets known by the names of Ross and Waren waters, which join before they reach the small pier which extends from the south shore at Budle, and thence run to Warnham bar, over which is a depth of 13 feet at high-water spring tides, but the bar shifts occasionally.

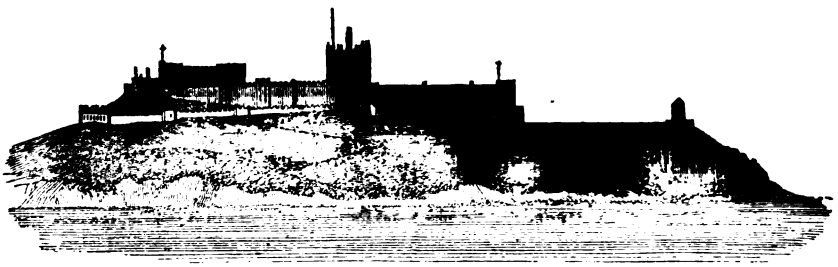
Budle beacon, at one-quarter of a mile west of the granary, in line with the pier-head, bearing S.W. by W., leads up Budle creek after the bar has been crossed; but the bar should never be attempted without a pilot or it having been previously buoyed at low-water. Pilots can be obtained at North Sunderland or Holy island. There is a small coasting trade in corn carried on from this creek.

BUDLE POINT and HILLS bound the south-eastern portion of Warnham estuary. On the north-eastern extremity of Budle hills is a signal-staff, which is used as a mark in several directions. A signal-house formerly stood here. Another mark among these hills is one of their summits named the Kettle Bottom (205 feet), and the group terminates to the westward in Outchester bluff. Chester and Easington hills lie farther to the westward, with two or three good farm-houses, which have steam engine chimneys near them, and which must not be mistaken for Outchester tower, which is lofty, and situated to the southward of these. At the south-west angle of Warnham flats is a mill and granary, with Waren house, white, with some trees near it, and which is useful as a mark.

Black Rocks, a broad reef, lie to the south-east, three-quarters of a mile from Budle point, and extend eastward 3 cables outside a point to which they give their name. The Herring-house at North Sunderland,

kept open to the eastward of the sand-hills to the south-eastward of Bamborough castle, leads clear of them.

BAMBOROUGH CASTLE stands upon a rock of considerable height rising abruptly from a flat beach, with sand-hills to the north-west and south-east of it. The principal tower of this noble and ancient castle (which is inhabited) is square and still perfect; and the turret on which the flagstaff is placed rises 208 feet above high-water. On the north-eastern outwork is a battery of twelve guns, and part of the tower of a windmill stands at the north-west end. To the westward of the castle lies the village of Bamborough, with a neat church, the square tower of which is also used as a mark.



Bamborough castle, S.W., ½ mile.

There is a charitable establishment here for the relief of shipwrecked seamen, under the direction of the trustees of Lord Crewe, a former bishop of Durham. Rockets, and lines, for effecting communication with stranded vessels, are kept in readiness. In case of fog, a gun (a 4-pounder) is fired every quarter of an hour by day. There is a look-out from the eastern turret, and in case of need, guns are fired and signals are made to alarm the people on the coast, and to satisfy a vessel in distress that her situation is observed.

Islestone, a reef of rocks, lying three-quarters of a mile south-eastward of Bamborough castle, projects 3½ cables to the eastward of the shore abreast, and is covered at half-flood. Ross house, open to the northward of Black Rocks point, bearing N.W. by W. (*see* view T.),* clears the reef.

Monkhouse, about one mile farther to the southward, and close to the beach, is roofed with red tiles; rocks extend for nearly half a mile on each side of the entrance of the creek that leads up to it. Here is a landing-place, where fresh water may be had.

Glororum village lies inland, about W. by N. ¾ N., 2 miles from Monkhouse; it stands high, and some trees and a tall steam chimney are con-

* The views referred to will be found on the Admiralty chart of this coast from Farn islands to Berwick, No. 111.

spicuous and useful as a sea-mark. The Barns are a few small houses half a mile to the southward of Bamborough castle. Green hill is a farm-house, with offices, half a mile farther to the southward. Elford is a small village on a rising ground, at some distance to the westward; it has trees about it, and a flagstaff on a mound.

Shorestone consists of a farm-house and village, and not far from it, near the stone, is a small steam chimney. New Shorestone is a house and offices, roofed with blue slates, half a mile to the westward of the former.

OUTCARS of SHORESTONE, a reef of rocks 2½ cables in extent about N.N.W. and S.S.E., and uncovered only at low spring tides, lies half a mile to the south-east of Monkhouse, three-quarters of a mile to the northward of North Sunderland pier, and one-third of a mile off shore.

Buoy.—The above reef is marked by a *chequered black* and *white* nun buoy, in 5 fathoms at low-water, with Monkhouse bearing W. by N. ¾ N.; and the entrance to North Sunderland harbour, S. ½ W. Green hill farm, open north-east of Monkhouse, bearing N.W., (*see* view, page 26,) leads clear inshore of the reef, in 6 feet at low-water; and North Sunderland cliff, bearing S. by E., clears it passing to the eastward.

NORTH SUNDERLAND SEA-HOUSES, three-quarters of a mile farther to the southward, has a small harbour about an acre in extent,* inclosed by two stone piers, built on a foundation of rock, with an entrance between them 21 feet in width, facing E.S.E., and secured by booms in bad weather. It has a depth of 12 feet at high-water springs and 8 or 9 feet at neaps, but dries at low-water. There are north and south beacons, 70 yards apart, one on the edge of the rocks on either side of the entrance, besides a warping-post off the pier-head. At the upper or north-western side of the harbour are four disused lime-kilns; and on the rocks, a short distance to the southward of the harbour, is a long building in an east and west direction, called the Herring-house, which is a useful sea-mark. If a vessel be bound in here, she should keep the Megstone and Farn island touching, until a pilot comes on board.

LIGHTS.—At the eastern pier-head is a *fixed white* light, and 100 yards S.W. by W. ½ W. from it is a *fixed red* light; they are shown from half an hour after quarter-flood to half an hour before three-quarters ebb.

Pilots.—There are pilots, under a master, at North Sunderland Sea-houses.

There are 27 large fishing boats belonging to the place, employing 150

* *See* Admiralty plan of North Sunderland harbour, No. 1,632; scale, mile = 20 inches.

men and boys. The chief exports are corn and fish. The population in 1871 was 953 persons.

Life-Boat.—Here is a life-boat, placed and supported by the Royal National Life-boat Institution.*

Car and South Rock Ends dry out to the extent of 2½ and 3 cables to the eastward of North Sunderland pier-head, and are steep-to, having 10 and 12 feet close to them at low-water. They must be carefully avoided in approaching the harbour from the southward. The western part of Green hill farm, open north-eastward of Monkhouse, bearing N.W. (*see* view on page 26), leads clear of the Car End and all the other rocks.

TIDES.—It is high-water, full and change, near North Sunderland, at 2h. 30m.; springs rise 15 feet, neaps 11½ feet, and neaps range 8 feet.

Heifer Law and Hebburn.—The country in the vicinity of this coast is flat, but a few miles inland it rises to a ridge of cultivated land, lying parallel to the coast; and, at a distance of 8 miles to the south-westward, Heifer Law (514 feet) will be seen, with a plantation on the northern extremity of the summit, and a tower on the south-east side; and Hebburn hill (1,024 feet) lies the same distance to the westward; both these hills are used as sea-marks. The summits of some of the Cheviots, which are much higher than Hebburn, as Hedgehope (2,325 feet), &c. are seen farther inland. On the northern declivity of the Great Cheviot (2,670 feet), is a curragh, or heap of stones, piled to a considerable height, as a mark for the shepherds when the hills are covered with snow.

Snook, or North Sunderland point, a cliff above 30 feet high, described on page 26, terminates this portion of the coast.

We now return to the detached dangers in Berwick bay, to the description of Holy island and adjacent rocks, and the group of Farn islands; with directions for this intricate navigation.

DANGERS in BERWICK BAY.—Spittal Hirst, a rocky shoal about 3 cables long from north-west to south-east, has 5 fathoms water over it, and from 8 to 10 fathoms around it. It lies with Berwick pier-head, bearing about W.N.W. nearly 4½ miles distant; Emmanuel head beacon, upon the north-eastern point of Holy island, in line with the eastern-most part of Bamborough castle, S. ⅔ E., 5 miles; and a remarkable round clump of bushes, at a considerable distance inland, in line with Cheswick, W. by S. ¾ S.

Inner Hirst is another rocky patch over which there is 6 fathoms at low-water. From it, Berwick pier bears N.W. ½ W., distant 4¼ miles;

* The life-boats stationed on the eastern coast of England, with a few exceptions, belong to, or are in connection with, the Royal National Life-boat Institution.

the north-west plantation at Low Lin, in line with the largest house in Goswick, S. W. ½ W.; and the west part of Bamborough castle, in line with the west part of the coves in Holy island, S. by E.

North Tours, three-quarters of a mile S. by W. ½ W. from the Inner Hirst, has also 6 fathoms over it. The marks for it are, Kyloe church, open to the westward of the village of Beal, bearing S.W.; and the signal-staff on Budle hill, open to the eastward of the priory at Lindisfarn, S. ¾ E.

It may be observed that the pilots at Holy island differ in the names they give to these shoals.

Outer Tours, with 6 fathoms over it, is two-thirds mile E.S.E. from North Tours.

Tours Reef, S.E. ¼ S. 1½ mile from North Tours, and close to the northward of and parallel to Park-dyke, has 2 fathoms on its shoalest part, and 4½ fathoms close to its edge. The marks for its eastern end are, Bamborough castle, just open to the eastward of the beacon on Emmanuel head, bearing S. ½ E.; and Berrington old hall, open to the northward of the new hall at Goswick, W. ¼ N.

Park Dyke is the south-eastern shoal of this group; it lies 2 miles to the northward of Emmanuel head, and has only 9 feet water on its shoalest part, close to which is 5 fathoms; it extends half a mile W. ½ N. and E. ½ S., and is about one cable in width. The marks for its eastern end are, Bamborough church, in line with the beacon on Emmanuel head, bearing S. ¼ E.; Holy island castle, over False Emmanuel head, S. ¾ W.; and Berrington hall, nearly in line with Goswick new hall, W. ½ N.

Wingate Reef, lying to the westward of Park-dyke, extends nearly one mile W.S.W. and E.N.E., and has on its shoalest part a depth of only 9 feet. From its eastern extremity, the beacon on Emmanuel head bears S.S.E. ⅛ E., distant 2⅓ miles; Berrington new hall is just clear to the northward of Goswick new hall; and Farn island high lighthouse, a little open to the eastward of the beacon on Emmanuel head, S.S.E., easterly. From the western end of the shoal, the signal-staff on Budle hill is in line with the west end of the Heugh of Holy island, bearing S. by E. ¼ E. The low-water margin of the main now extends so near to the reef that no vessel should use the narrow passage between.

Beanstack is a rocky shoal of 9 feet, which lies close to the northward of Wingate reef, and nearly parallel to it. From its eastern end, the beacon on Emmanuel head bears S.S.E. ½ E., distant 2¾ miles, and Holy island castle appears in line with the centre of the banks near Snipe point, S. by E. ¼ E. The west end lies with the signal-staff on Budle hill, just open to the eastward of the belfry on Holy island,

bearing S. by E.; and Wingate gap in line with the southernmost houses at Beal.

North Beanstack.—A large tract of foul ground, called the North Beanstack, lies to the north-westward of the Beanstack, and extends above half a mile in a W. by N. and E. by S. direction, its least depth being 5 fathoms. Kyloe church seen to the northward of Beal trees leads over it.

Directions.—The signal-staff on Budle hill brought in line with the beacon on Emmanuel head, bearing S. ¼ W. (view B.), is the general mark for clearing all the shoals in Berwick bay; and vessels bound to Berwick should not cross this line till Berwick pier lighthouse bears N.W. by W. ½ W.; they may then close the harbour, passing between the Spittal Hirst and Inner Hirst.

By night, Farn high light must not be brought to bear eastward of S. by E.

TIDES.—It is high-water, full and change, at Berwick, at 2h. 18m.; springs rise 15 feet, neaps 11½ feet, and neaps range 8 feet. In Berwick bay the direction of the flood stream varies from S.S.E. to S.E., and the ebb *vice versâ*, the inshore portion of the streams following the curvature of the strand: the fishermen state that there is an indraught after strong easterly winds.

HOLY ISLAND* (anciently Lindisfarn) is of a quadrangular form, about 1½ square mile in area, and having in addition a long narrow ridge of low sand-hills, locally termed the Snook, extending from its north-western angle nearly 2 miles in a westerly direction towards the main land at Beal point. The Snook end is separated from the main by a sandy tract 1,200 yards wide, which is generally covered by the sea for three hours out of every twelve; thus rendering Holy island, as Bede terms it, only semi-isle. The ruins of the stately priory, the castle, the church belfry, the beacon on the Heugh, and the square building near it, are all used as marks in the navigation of the coast and harbour.

The main body of the island is based on limestone rock, which, on the northern, eastern, and southern sides, extends seaward fully 400 yards at low-water; on the west side, as before observed, is a waste of sand known as Fenham flats. On the south-west part of the island is the village of Lindisfarn, inhabited chiefly by fishermen, including 34 pilots and a buoy master, under the jurisdiction of the Trinity house of Newcastle. Near the south-east point is the castle, a very conspicuous object on a picturesque

* *See* plan of Holy island harbour, with views, on Admiralty chart, Farn islands to Berwick, No. 111.

rock, with its summit 108 feet above the level of high-water, and a limekiln adjoining it to the eastward; otherwise, the island is a moderately elevated plain sloping to the south-west.

Emmanuel Head, the north-east point of Holy island, is a cliff barely 10 feet high, on which is a sharp pointed stone pyramid, painted *white*, its summit reaching 48 feet above high-water. The first projection westward of Emmanuel head is called False Emmanuel head, and the second Snipe point. Between the latter points are two sandy coves, fronted by rocks which extend one-third of a mile off shore. From Snipe point, a ridge of low sand-hills stretches nearly 2 miles about W.N.W. to Snook end, having an old windmill tower near its extremity. On the north side of this sand ridge is Swinnow Goat, or Gut, through which the flood tide first enters to cover the flats.



Emmanuel head beacon.

The Heugh is a green hill at the south-west angle of the island, bordered by a dark-coloured rocky cliff, 45 feet high, towards the harbour. About midway along the hill is a wooden signal-beacon with a triangular head and mast, its summit 80 feet above high-water. Towards the western extremity of the Heugh is a small roofless building, called the Look-out; to the northward of the latter are the ruins of the priory; and to the west of the ruins is the church, the belfry of which is a useful mark for leading into the harbour. The village lies to the northward of the priory.

HOLY ISLAND HARBOUR.—The entrance is between the south-east point of Holy island and the flat which extends from the Old Law. Its spacious high-water aspect is much diminished on the ebb, the breadth of the anchorage off the Heugh being only 2 cables, with depths of 18 to 24 feet in the deeper portion of it. It is, however, secure and well sheltered.

This harbour has proved useful for refuge to many vessels; 47 fishing boats belong to the place. There are several springs of fresh water. The population of the village and island in 1871, 876. The buoys and beacons about Holy island are under the jurisdiction of the Trinity house of Newcastle; the lighthouses on Farn islands are under that of the Trinity house of London.

Life-Boats.—There are two life-boats belonging to Holy island: one boat being stationed at the island, and the other near the southern end of the Old Law, which is manned by a crew from the island in the event of a wreck occurring to southward of the harbour. Rocket apparatus is also provided.

At about one cable from the western point of the Heugh is a small rocky projection which at high-water forms an islet, but is connected with the Heugh at low-water. It is called St. Cuthbert isle, and is the Hob Thrush of the pilots. A cove called the Ooze, on the east side of the Heugh, being dry at low-water, and clean, is a convenient place for vessels taking the ground to repair.

On the south and west sides of the harbour is a sand and gravel beach, but near low-water mark there are some shoals and rocks to be noted.

Long Bat and Sand Bat are spits of shifting sand from Fenham flats, to the north-west and south-west of the anchorage.

Seal is a shoal with 3 feet over it, 2 cables N.N.E. of Black Law, and only half a cable to the westward of the direct course to the anchorage.

Law Scarp, a patch of stones 1½ cable E.S.E. of Black Law, dries at low-water.

Nob is a small mass of sand, with only 6 feet over it, lying on the south-west side of the entrance channel, with the high beacon on the Old Law just open to the south-westward of the low beacon. As the Nob is only a ship's length to the southward of the turning point of the leading marks into the harbour, the seaman must be careful when altering the course to haul to the northward in good time.

Parton Stiel and Bat.—Parton Stiel is a stony patch projecting half a mile East from the centre of the Old Law, and uncovered at low-water. This patch, and the Bat, a shoal with 3 feet on it one-quarter mile to the south-east, may be said to form the south-west side of the entrance to the harbour.

On the north-east side of the channel the dangers are :—

Stone Ridge, a reef extending half a mile about N.W. and S.E., in connection with the low-water shore of the island, is covered 3 feet at high-water springs, and when its top is just visible above the surface of the water, there is a depth of 20 feet over the bar in the line of the leading marks.

Middles.—A patch of foul ground called the Middles, with only 3 feet water over it, projects from the centre of the Stone Ridge towards the fair-way. As the line of the leading mark passes only a ship's length to the westward of this patch, great care must be observed not to open the belfry to the eastward of the Heugh beacon. The channel between the Middles and Law Scarp is only one cable in width.

Wheel Rig is a very small detached 3-feet shoal, lying off the north-west end of the Stone Ridge.

Ridge End, a detached rocky patch, with from 2 to 5 feet water over it, and with spits of foul ground projecting from it to the eastward and southward, lies south of Castle point, and between Burrows Hole and Hole Mouth, which are two gaps in the reef of rocks which fringes the island on this side.

Buoy.— A *black* buoy lies at the south-eastern side of the Ridge End, in about 5 feet at low-water; with Holy island castle bearing N.N.W. $\frac{3}{4}$ W.; the beacons on the Old Law, W. $\frac{1}{4}$ S.; and Plough rock beacon, N.E. by E. In northerly winds, a vessel drawing 9 feet may round close to the southward of the buoy, after half-flood.

The Yares, at 2 cables to the south-west of the castle, are the highest part of the flat foreshore, and when they are covered, there is a depth of 11 feet over the bar in the line of the leading marks.

HOLE MOUTH, the small opening between Castle point and the Ridge End, has a depth of 6 or 7 feet at low-water. Vessels driven too close in-shore to weather the Ridge End, have in several instances been saved from destruction by boldly running into this hole.

OFFING DANGERS S.E. of HOLY ISLAND.—There are several outlying reefs to the south-eastward of Holy island; the outermost of these, the Goldstone, Guzzard, &c., are connected both with Holy island and Farn islands by a bank, or broad ridge, having only 7 fathoms over it, while between Farn island or the Inner Farn and the mainland is a depth of from 10 to 12 fathoms; the innermost of the reefs, the group of the Plough, is closely connected with Holy island by a 4-fathoms bank.

Plough Rock, E. by S. $\frac{1}{4}$ S. nearly three-quarters of a mile from Holy island castle, uncovers for about 40 yards at half-ebb, and is 7 feet in height at low-water.

Beacon.—On the north-western extremity of Plough rock is a black wooden beacon or perch, reaching to 8 feet above high-water, with a ball on its summit. The marks for this perch are, the Heugh beacon just open to the northward of Holy island castle; and the hollow to the west of Kettle-Bottom hill, in line with the east end of the granary at Budle pier, bearing S. by W.

Plough Seat is a narrow reef partly visible at low tide, extending E. by S. $\frac{1}{4}$ S. one-third of a mile from Plough rock. The marks for the eastern end are, the beacon on the Heugh, just open to the northward of Holy island castle, bearing W. by N. $\frac{1}{4}$ N.; and Hebburn hill (10 miles distant), in line with the highest house in Ross village, S.W. $\frac{1}{4}$ W.

Buoy.—A *red* nun buoy generally lies in 4½ fathoms at low-water off the eastern end of the Plough Seat, but in heavy gales it is sometimes driven a cable to the south-westward.

Wingate, bearing E. by N. ¾ N., nearly one-quarter of a mile from the Plough beacon, is visible at very low spring ebbs.

The Patch is a small rock half a cable S.E. of the Wingate.

Outer Wingate is a small rock on which the sea generally breaks, having only 6 feet over it at low-water; it lies E.N.E. four-tenths of a mile from the Plough beacon, with the ruins of Lindisfarn priory, in line with the north end of Wingate Gap, bearing W. ¾ N.; and St. Cuthbert tower on the Farn, open to the west of the Megstone at low-water, S.S.E. ¼ E.

Minscore, the northernmost of the Plough group, lies N.E. ¾ E., four-tenths of a mile from the beacon, and has a depth of 9 feet upon it at low-water. The marks for it are, Black Law, just clear of the high-water margin at Castle point, bearing W. by S. ½ S.; and the ruins of the priory, in line with Wingate Gap, W. ½ N.

Goldstone is a dangerous rock lying E.S.E. from the eastern extremity of the Plough Seat, leaving a channel between them one mile in width; its highest part is 4 feet above low-water, and is therefore only visible for about three hours at spring tides. The marks for it are, the Look-out on the Heugh, just touching the south side of Holy island castle, bearing W. by N. ½ N.; and the Megstone, half its breadth open to the westward of Farn island, S. by E. ¼ E. When on this rock, the towers of Farn lighthouses do not show open of each other, and, in consequence of the distance between them being so small, they form a slow and uncertain mark for Goldstone channel.

CAUTION.—A *black* nun buoy usually lies in 7½ fathoms at low-water at the west end of the Goldstone, but it is sometimes driven from thence 1¼ cable to the south-west of the rock, where it generally holds on; the uncertainty of its position, as well as that of the Plough Seat buoy, should always be remembered when navigating between these dangers.

Stiel Reef extends S.E. by E. ¾ E. nearly half a mile from the Goldstone, and is partially visible at low ebbs. From its eastern end, the north side of the Heugh is touching the south side of Holy island castle, bearing W. by N. ¾ N.; and the Megstone is well open to the eastward of North Sunderland point, S. ¾ E.

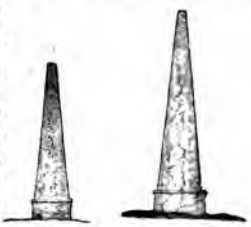
St. Nicholas Rock lies N.N.W. ¼ W., 3½ cables from the Goldstone, and although it has 15 feet water over it, the sea often breaks on it heavily. Its marks are, Kyloe (St. Nicholas) church, just open to the north

of Holy island castle, bearing W. by N.; and the east side of the Megstone, just open to the westward of Farn island, S. by E. ¼ E.

Guzzard, a rocky shoal, with a depth of 2 fathoms over it at low-water, lies S. ⅔ E. half a mile from the Goldstone; it extends to the westward almost to the line of Farn lighthouses over the Megstone, where it deepens to 3 fathoms. From its centre, the easternmost part of the Megstone is in line with the western part of Farn island, bearing S. by E. ¼ E.; and the beacons on Old Law are in line with the south part of Wingate Gap, W. by N. ¼ N.

Tree-o'-the-House, a rocky spot with 4¼ fathoms water over it, lies S. by W., half a mile from the Guzzard; with St. Cuthbert tower, just to the westward of the highest part of the Megstone, bearing S. by E. ¾ E.; and a large house at Outchester, in line with the granary at Waren bridge, S.W. ⅔ W.

Directions for Holy Island Harbour.—In coming from the northward, vessels may proceed through Goldstone channel by keeping the lighthouses on Farn island (*see* page 15) in line, over the centre of the Megstone, bearing S. by E. ½ E., easterly (view E.); or by keeping Outchester tower, in line with the north-west chimney of Waren house, S.S.W. ¾ W. (view M.); until the obelisk shaped beacons on Old Law (view F.) appear in line, bearing W. by N.; proceed with them so, until the beacon on the Heugh comes in line with the church belfry, bearing N.N.W. ¾ W. (view I.), when hard a port, and this latter mark will lead up to the anchorage. The depth over the bar is 8 feet, and abreast the Heugh from 18 to 24 feet at low-water.



East beacon. West beacon.

The ebb stream runs out of the harbour with great rapidity, and forms a race in the centre of the channel, which the pilots avoid by edging over on one side; this, however, can only be done by persons well acquainted with the place. The marks for entering as given above are very distinct, but the narrowness of the channel will not allow of any freedom being taken with them by a stranger, and they should be kept exactly in the line as directed.

When the weather is rough and pilots cannot get off, the flag-staff of the beacon on the Heugh will be struck across, as shown in Fig. 2, until the proper period of tide for vessels to enter, when it will be raised erect and a *blue* flag hoisted, as represented in Fig. 1.



Fig. 1. Fig. 2.
Heugh beacon.

Inside the Plough.—Vessels which may be obliged to take the channel inside the Plough, must keep the east end of Budle granary, just open to the westward of Kettle Bottom hill bearing S. ¼ W., which clears the Ridge End, till the beacons on Old Law come in line as before.

From the Eastward.—A vessel outside the Goldstone and all the shoals, which may be known by the Herring-house at North Sunderland being open to the eastward of the Megstone, bearing S. ¼ W., or when Farn high lighthouse bears to the westward of South, may pass between the Goldstone and the Guzzard with the beacons on Old Law in line, W. by N. (view F.), and then into the harbour as before directed.

From the Southward.—After passing outside the Megstone, or inside of the Swadman, vessels may edge away at once through Skate road towards the mouth of the harbour, only taking care to avoid the bar at its entrance by keeping the east end of Budle granary open to the westward of Kettle Bottom hill, bearing S. ¾ W. Farn lighthouses open to the westward of the Megstone clears the Guzzard to the westward, while the mark for clearing the Bat is the church belfry open to the north-eastward of the beacon on the Heugh, bearing N.W. by N.

The mark for entering Hole Mouth is the Heugh beacon just touching the northern side of the Look-out, bearing N.W. by W., westerly, when the church belfry will also be just clear of the angular part of the ruins of the priory.

When there is not sufficient water over the bar to enter Holy island harbour, vessels may await tide time by anchoring in Skate road, directions for which are given on page 23.

TIDES.—It is high-water, full and change, at Holy island harbour, at 2h. 30m. On the bar, springs rise 15 feet, neaps 11½ feet, and neaps range 8 feet.

FARN ISLANDS.

Farn islands or Staples are two rocky groups, 3 miles in extent, in an E.N.E. and W.S.W. direction, the innermost of which is situated 1¾ mile to the eastward of Bamborough castle. Like the generality of small islands where there is a considerable rise and fall of tide, they present very different aspects at high and low water, and the navigation is thus rendered additionally dangerous.

There are two sounds or passages for shipping; that between Farn island and the main land is called the Inner sound, and the other between the two groups is called Staples sound; the former is $1\frac{1}{10}$ mile, and the latter half a mile wide at low-water.

FARN ISLAND, the nearest to the main, is the highest of the cluster, on the south-west side it is a bold cliff of columnar basalt 45 feet

high, which slopes gradually to the north-east; its whole length from north-west to south-east being 520 yards.



Farn island, East, half a mile.

On the north-east part of the island is St. Cuthbert tower, an old square building, formerly used as a lighthouse, already referred to; and near to it an old house apparently built of the ruins of a chapel. The surface of the island is covered with Farn grass; the only residents are the four light-keepers and their families. At a short distance to the eastward of the low lighthouse is a cavity in the rock, with a hole above, through which in north-east gales the sea is forced, and forms a *jet d'eau* called the Churn.

Signals, by a *black* ball in day time, and rockets at night, are made from Farn island when a life-boat is required in the neighbourhood.

LIGHTS.—There are two lighthouses on Farn island;* both the light-towers are coloured white, as are also the detached dwellings of the light-keepers, and the enclosure wall.

The high lighthouse stands about 27 yards from the south-west cliff, and the centre of the lantern is 87 feet above the level of high-water. The light is *white* and *revolving*, showing the full face of a reflector *every half-minute*, and visible at 15 miles distance all round the compass. The low lighthouse is near the north-west point of the island, and exhibits a *fixed white* light, at 45 feet above high-water; it bears N. by W. ½ W. westerly, 187 yards distant from the high lighthouse, and may be seen in a northerly direction 12 miles, between the bearings S.S.E. ½ E. and S. by E., but it is not visible from the southward. The lights in line, bearing S. by E. ½ E.

* A consideration of the dangers around Farn islands induced the Trinity House of London, in 1810, to cause the lights to be altered and improved; and notice was accordingly given that, from the 20th January 1810, they would be exhibited with an additional number of lamps and reflectors, producing lights of increased brilliancy; and at the same time, that a small third light would be erected, to serve as a leading light through Goldstone channel. This was effected in the course of the year, and, in January 1811, a general description of and directions for the islands were issued, and a patent for levying tolls was obtained. In December 1821, the Farn lighthouses were purchased of the proprietors for the public by the Corporation of the Trinity House of London, when the lights were further improved, and the outer light transferred from the Brownsman to the Longstone. They are reflecting or catoptric lights; the Inner Farn having seven and the outer six burners. It is estimated that 25,000 vessels annually pass Farn islands.

easterly, leads between the Goldstone and Plough Seat, but directly over the Megstone.

Wide Opens are two rocky islets lying E.S.E from the Farn; they have rugged cliffs to the south-west, and slope gradually to the north-east.

Scarecrows and Bush.—A little farther to the eastward are two black rocks always above water, called the Scarecrows, to the E.S.E. of which Bush reef extends one-quarter of a mile, and is partly visible at spring ebbs. The marks for the eastern extremity of this reef are, the windmill tower on the north-west end of Bamborough castle in line with the south-east cliff of the easternmost Wide Open; and the south end of the granaries at North Sunderland Sea-houses open to the north of the plantation on Heifer Law. The signal-staff on Budle hill, open to the southward of Farn island, bearing W. by N. $\frac{3}{4}$ N., leads to the southward of the Bush and the other shoals of the group.

Knox Reef, visible at low-water, extends two-thirds of a mile to the eastward of the Farn, from whence the water deepens to 12 fathoms in Staples sound. The lime-kilns at North Sunderland, in line with the East Scarecrow, bearing S.W. by S.; and Hebburn hill, midway between the lighthouses on Farn island, W. by S. $\frac{1}{8}$ S.; are the marks for this low-water extremity; they are here given because no satisfactory mark can be furnished for leading through Staples sound, and they might, therefore, in conjunction with the lead, as the soundings are pretty regular, be useful in an emergency.

Kettle.—The north-western angle of Knox reef forms with Farn island a small basin called the Kettle, having from 7 to 12 feet water in it, over a sandy bottom. The entrance is from the northward, and when proceeding in, keep in mid-channel with the beacon on Emmanuel head just touching the east side of the Megstone, remembering to allow for the set of the tide. Anchor abreast St. Cuthbert tower.

Megstone is a black rock with its summit about 16 feet above high-water, and is a useful sailing mark. It lies N. by W. $\frac{1}{2}$ W. westerly, one mile from the high lighthouse on Farn island. There is a depth of 4 or 5 fathoms within 20 yards of its eastern side, but from the opposite side a reef extends W. $\frac{1}{2}$ N. about half a mile, and is partly visible at low-water.

Swadman, the western extremity of the reef from the Megstone, is marked by a *black* nun buoy, from which Farn high lighthouse bears S.E. $\frac{3}{4}$ S., $1\frac{1}{4}$ mile distant, and Longstone lighthouse, East. From the western end of the Swadman, Bamborough church is in line with the highest sand-hill near it, lying to the northward of the castle, bearing S.W. by W. $\frac{1}{2}$ W.; and the base of the eastern beacon on Old Law is seen clear of the adjacent

sand-hills, N.W. ½ N.; but as these marks are not very plain, and as the buoy might be driven from its position, the western end of the reef will be avoided by keeping the Heugh beacon on Holy island, in line with the church belfry, bearing N.N.W. ¾ W., when the base of Old Law east beacon will be shut in behind the low point of the sand-hills.

Elbow is a small rocky shoal, with only two feet over it at low-water, E. ¼ S., 2½ cables from the Megstone, and much in the way of vessels passing between the latter and the Oxscar. It lies with the low houses at Shorestone just open to the southward of the south part of Heifer Law; and Farn high lighthouse, appearing between St. Cuthbert tower and the low lighthouse, but rather nearer to the latter, bearing South, easterly.

Oxscar is a small rock, about 6 feet above low-water, lying nearly half a mile N.E. by E. ½ E. from the Megstone, and N. ½ E. from Farn high lighthouse. The marks for this half-tide rock are, the keep of Bamborough castle in line with the Megstone, and Farn high lighthouse appearing midway between St. Cuthbert tower and the low lighthouse. A reef extends from it 1½ cable to the westward.

Glororum Shad, with 2 fathoms over it at low-water, bears from Longstone lighthouse about West, and from Farn high lighthouse N.N.E. ¼ E., distant 1⅛ mile. The marks for the shoalest part of this patch are, Dunstanborough castle in line with the west part of the east Wide Open; and the signal-staff on Budle hill, in line with the north part of the Megstone, bearing W. ¼ S.

To the north-east of Glororum Shad there is foul ground, but with comparatively deep water over it; upon one spot, however, there is only 5 fathoms, with Bamborough church, in line with the Megstone, bearing W. by S. ¾ S.; and the east point of the eastern Wide Open islet, open of North Sunderland point, S. by W.

Islestone Shad is a small rocky patch, with but 9 feet over it at low-water, and a sea generally breaking. It lies with Farn high lighthouse bearing S.W., distant $\frac{8}{10}$ of a mile; Longstone lighthouse, E. by N. ½ N.; Dunstanborough castle, just open to the eastward of the east Wide Open, S. by W.; and Islestone rocks (on the coast), in line with Hebburn hill, W. by S. ½ S.

STAPLES.—The islet called the Staples, a name often applied to the whole group, is the westernmost of the outer cluster of islets. It is of a triangular shape, having a square building on it, the remains of a former lighthouse. Its southern side is a bold cliff, with some detached rocks, called the Pinnacles, which have the appearance of broken pillars. From its

south-west point, a sunken danger called Gun reef extends one-quarter of a mile to the north-west, having towards its outer end two patches of rock named Gun rock, uncovered before half-ebb. The tangle shows along the reef at low-water. The plantation on Heifer Law, open to the north-west of North Sunderland Sea-houses, bearing S.W. ¾ S., is the mark for the western extremity of this reef.

Brownsman Isle almost joins Staples islet, and has near its north-west end the square tower of its old lighthouse. Close to the northward of the Brownsman lie two rocky islets, the Wamses, from which a reef projects to the north-west and north-east for about one cable; and other islets, called Hawker and Blue Caps, are immediately to the eastward of the Wamses.

LONGSTONE, so called from its form, lies three-quarters of a mile N.E. by E. ¾ E. from the old tower on the Brownsman. At low-water it forms one narrow islet half a mile long, but which is separated into several parts at high-water. Its eastern side, which is very rugged, is the highest.

LIGHT.—A lighthouse stands on the western side of Longstone islet; it was built in 1826, and the tower is painted red. The light is *white* and *revolving*, showing a *bright flash every half-minute*, and it may be seen in clear weather 15 miles distant; the lantern is 75 feet, and the top of the vane 85 feet, above the level of high-water. From it, Farn high lighthouse bears S.W. by W. ½ W.*

Fog Signal.—During thick or foggy weather a horn gives *two* blasts in quick succession *every two minutes.*

An extensive reef of rocks fills up the space between the Wamses and the Longstone, and from their northern points shoal water extends one cable.

Knavestone is the easternmost rock that dries, its summit being 11 feet above low-water, thus showing at two hours' ebb. It is nearly half a mile distant from the Longstone, and Farn high lighthouse, in line with Longstone lighthouse, bearing S.W. by W. ½ W., leads over it.

Whirl Rocks are one-quarter of a mile to the north-east of the Knavestone; one of them has only 2 feet over it, while the others have from 2½ to 3½ fathoms over them; from the outer part, Longstone light-

* It was on the Longstone or Outer Farn that the *Forfarshire* steamer, plying between Hull and Dundee, was wrecked, at four in the morning of the 7th September 1838, with fifty-three persons on board, when thirty-eight perished; nine were saved by the heroic exertions of the light-keeper, J. Darling, and his noble daughter Grace, whose memory will long be blessed. A similar catastrophe occurred on the Inner Farn or Farn island, on the 20th July 1843, when the *Pegasus* steamer, from Leith to Hull, struck on the rocks and sunk, when upwards of sixty individuals were drowned.

house bears S.W. by W. southerly, distant three-quarters of a mile. As the tide streams near these rocks and the Knavestone are extremely rapid, and whirl in various directions, vessels are recommended never to approach them nearer than 2 miles.

Crumstone, which is the southernmost of the Staples group, is a flat black rock, partly covered at high-water, and from it Longstone lighthouse bears N. $\frac{1}{4}$ W., about one mile distant.

Callers.—A reef called the Callers extends nearly 3 cables from the Crumstone to the north-west, and from its extremity Longstone lighthouse bears N. by E.; the northern side of the Megstone touches the south-west point of Staples isle, W.N.W., westerly; and Glororum engine chimney is in line with Farn high lighthouse, W. $\frac{1}{2}$ S.: rocks also extend for one cable to the south-eastward.

Fang is a small rock, with a depth of 9 feet over it at low-water, about one cable S.W. by W. $\frac{1}{3}$ W. from the Crumstone; with the south part of Bamborough castle, in line with the north side of St. Cuthbert tower, bearing W. $\frac{1}{2}$ N.

Anchorages.—On the south side of Farn island and of the Wide Opens is a depth of 9 fathoms, with a sandy bottom, where Longstone lighthouse is just open to the south-eastward of these islands, bearing N.E. $\frac{2}{3}$ E.; and Farn high lighthouse, N.W. $\frac{3}{4}$ N.; or Holy island castle is in line with the south-west cliff of Farn island; and there a vessel may anchor during northerly winds.

On the north side of the Farn is a small space where a vessel may anchor for a tide during southerly winds, on shingly ground, in 8 fathoms. The marks for it are, the westernmost North Sunderland Sea-house, just open to the westward of Farn island, bearing S. by W. $\frac{1}{4}$ W.; and Bamborough barns in line with Hebburn hill.

Vessels on an emergency might anchor to the southward of Staples island, where, at the distance of 2 cables, they will find sandy ground in 12 fathoms. The square tower on Brownsman isle in line with its highest cliff, marks the eastern extremity of the clear ground; and the same tower in line with the remains of the old lighthouse on Staples isle, marks its western limit.

Directions for Farn Islands.—In approaching Holy island or the Staples from any direction seaward, the lead will be a sure guide; for as long as a depth of 35 fathoms is maintained, that offing will be sufficient to carry a vessel 2 miles to the eastward of the Knavestone and Whirl rocks.

CAUTION.—At night, or in thick weather, do not attempt to pass in a less depth than 35 fathoms, on account of the character of the shoals and

the varying indraught of the tide streams between the islands. A depth of 30 fathoms under such circumstances would be unsafe.

While proceeding through any of the channels by the leading marks, it would be prudent to check frequently the bearings by compass, in order to guard against fogs or the drifting of buoys, a precaution particularly necessary in iron vessels.

Outside Passage to the Southward.—Having avoided the shoals in Berwick bay, by the directions given on page 8, and having then kept out and advanced so far as to have Emmanuel head bearing W. $\frac{3}{4}$ N., and therefore closing Holy island shoals, North Sunderland point must be brought open to the eastward of the Megstone; if the wind be scant, keep the eastern Sea-houses at North Sunderland to the eastward of the Megstone, bearing S. $\frac{1}{2}$ W. (view G.); or, if by night, keep Farn high light to the west of S. $\frac{1}{2}$ W. After thus clearing the shoals off Holy island, the vessel should stand off to the depth of 35 fathoms, and not be hauled in again until Knavestone and Whirl rocks have been fairly passed, which will be when Farn high light bears N.W. by W. $\frac{1}{4}$ W. If by day, and it be necessary to make a tack in-shore, the lighthouse must previously be brought on that bearing, or else bring Budle hill signal-staff open to the southward of Farn island, bearing W. by N. $\frac{3}{4}$ N., which clears the Crumstone, Fang, and Bush.

To the Northward.—Having passed to the northward outside the Staples in 35 fathoms, or, if in clear weather, at a sufficient offing, and brought Longstone light to bear S.S.W. $\frac{3}{4}$ W., Farn high light will appear well open to the westward of it, and a vessel bound to Berwick may then haul in until Longstone light bears S.S.E. $\frac{1}{4}$ E., and proceed with it on that bearing until Berwick pier light bears N.W. by W. $\frac{1}{2}$ W., when she will be in the fairway for the harbour.

Inner Passage to the Southward.—In approaching Goldstone channel from the northward, the signal-staff on Budle hill must not be opened to the westward of the beacon on Emmanuel head, in order to clear all the shoals in Berwick bay (view B.); and when the vessel arrives within one mile of Holy island, she should gradually edge outward in order to take up the proper mark for the channel. This mark is, Farn lighthouses over the centre of the Megstone, bearing S. by E. $\frac{1}{2}$ E., easterly (view E.) and it will lead in the fairway and clear to westward of the Guzzard, in about 4 fathoms, which rocky shoal will have been passed when Kyloe church just opens to the southward of Old Law beacons. The same track passes to eastward of, but very closely, the Tree-o'-the-House, after which the course is clear to the Megstone. The Megstone may be passed at the distance of about half a cable on its eastern side, or Farn high lighthouse

brought less than its own height open to the eastward of the low lighthouse will lead through in mid-channel; then pass round the western side of Farn island at a cable's distance, and shape a course according to circumstances.

By Night.—In running for Goldstone channel from the northward by night, Farn high light should not be brought to the eastward of S. by E. till the vessel be nearly abreast Emmanuel head, by which time the low light ought to be visible; if not, the channel must not be attempted. But when distinctly seen, bring it in line with the high light, and very exactly, for the two lights are so near each other that they would appear but little open, even at the sides of the channel. Having taken up this mark in good time, keep it on till Longstone light bears E. by S. $\frac{3}{4}$ S., and then open the high light to the eastward of the low light, rather less than the apparent difference of their heights. This position of the lights will carry a vessel securely through Megstone channel, after which she may round the western side of the Farn and proceed to the southward, but with this caution that Farn light must be kept bearing N. by W. $\frac{1}{4}$ W., or to the westward of it, in order to clear the foul ground off North Sunderland point.

Inner Passage to the Northward.—Passing North Sunderland point towards the Inner channel, the Grimstone, which lies one-quarter of a mile E. $\frac{3}{3}$ N. from the Snook, will be avoided by keeping in a depth of at least 8 fathoms; or the Megstone, just in sight to the westward of Farn island, bearing N. by W. $\frac{1}{4}$ W. (view V.), will lead well outside it. The Herring-house, open eastward of North Sunderland pier, bearing S. $\frac{1}{2}$ W., clears the Outcars; Monkhouse rocks are connected with the beach, and the Islestone is avoided by keeping Ross house, open to the northward of Black rocks point, bearing N.W. $\frac{3}{4}$ W. (view T.), or a remarkable sharp peak of Kyloe hills in line with the same point.

Megstone and Goldstone Channel.—When Farn high lighthouse bears N. by W. $\frac{1}{4}$ W., the vessel may be at once steered for it, and the island may be safely rounded at a cable's distance. Then open the high lighthouse to the east of the low lighthouse, rather less than the apparent difference of their heights, and keep them so till the Megstone has been passed on its eastern side at not less than half a cable; when the lighthouses brought in line, bearing S. by E. $\frac{1}{2}$ E. easterly, and directly over the Megstone (view E.), will lead just to the eastward of the Tree-o'-the-House, very little to the westward of the Guzzard, and through Goldstone channel. This passage between the Goldstone and Plough Seat should never be attempted unless the leading marks or lights be distinctly seen, for the soundings are irregular and the tide streams are rapid.

By Night.—Vessels from the southward should not pass North Sunderland point during the night in a less depth than 12 fathoms, and for that purpose, Farn high light should not be brought farther to the northward than N. by W. $\frac{1}{4}$ W. On that bearing, a vessel may approach Farn island, whence a course must be shaped along its western side and round its north-west point at a cable's distance until the high light appears open to the eastward of the low light, rather less than their apparent difference in height, and kept in that position they will lead in mid-channel between the Elbow and the Megstone.

Having passed the Megstone, the lights on Farn island brought in line over the centre of the rock, bearing S. by E. $\frac{1}{2}$ E., easterly, will lead between the Goldstone and Plough Seat till abreast Emmanuel head, when Farn high light must be brought S. by E., but not to the eastward of that bearing, (when the low light becomes obscured seaward,) in order to clear the shoals in Berwick bay.

Junction with Outer Passage.—As some vessels may find it convenient to take the outer passage, after having passed between the Megstone and Oxscar by the above directions, they should in such case continue with Farn lights in line till Longstone light bears E. by S. $\frac{3}{4}$ S.; they may then haul out till Farn high light bears S. $\frac{3}{4}$ W., on which bearing it will lead eastward of all the Holy island shoals. A safe mark for clearing these shoals in daylight is the Herring-house, near North Sunderland harbour, in line with the Megstone, bearing S. $\frac{1}{3}$ W. (view G.)

Directions for Inner Sound.—Again, vessels from the southward not being able to fetch Megstone channel, or to distinguish the buoy of the Swadman, may pass through the Inner sound by keeping Farn high lighthouse S.E. $\frac{1}{4}$ E. till Longstone lighthouse bears E. $\frac{1}{2}$ S., or till Bamborough castle bears S. by W. $\frac{3}{4}$ W.; they will then have passed the Swadman, and may readily get far enough to windward to bring the Megstone and Farn lighthouses in line, as before directed. Or if, from other motives, they should then pass to the westward of the Swadman, and now wish, the wind being favourable, to gain the outer passage, they have only to run out N.E. $\frac{3}{4}$ E., as soon as the Longstone bears E. $\frac{1}{2}$ S., and bringing Farn high lighthouse S. $\frac{3}{4}$ W., proceed to the northward with it on that bearing.

After passing the Megstone and the Oxscar, as soon as Longstone lighthouse bears E. by S. $\frac{3}{4}$ S. haul out and pass to the eastward of the Guzzard and Stiel by bringing Farn high lighthouse to bear S. $\frac{3}{4}$ W., and proceed to the northward with it on that bearing.

West of the Swadman.—If, having approached Farn island, it should be deemed advisable to pass to the westward of Swadman reef, that

may be effected by bringing Farn high lighthouse to bear S.E. $\frac{1}{4}$ E., and keeping it on that bearing till Longstone lighthouse bears E. $\frac{1}{2}$ S., when a vessel may haul out to the eastward till Farn lighthouses are in line S. by E. $\frac{1}{2}$ E., easterly, and so proceed through Goldstone channel, or haul out still farther to the eastward, till Farn high lighthouse bears S. $\frac{3}{4}$ W., and then pass outside of the Stiel as before directed.

Directions for Skate Road.—Skate road is so much exposed to the eastward, that it should only be used for anchorage during westerly winds, or when vessels can neither keep the sea nor enter Holy island harbour.

From the Southward.—In running for the inner passage from the southward, and so into Skate road, the Megstone should be kept touching the west side of Farn island, bearing N. by W. $\frac{1}{4}$ W. (view V.), or Farn high lighthouse kept N. by W. $\frac{1}{4}$ W., till within a cable of the cliff, when the high lighthouse must be brought to bear S.E. $\frac{1}{4}$ E., and kept on that bearing in order to clear the Swadman; and when Longstone light bears E. by S., anchorage will be found on a sandy bottom, in 6 fathoms; or, as the water shoals regularly towards the shore, vessels may feel their way by the lead farther to the northward, till Longstone lighthouse bears E. by S. $\frac{3}{4}$ S., southerly, when Kyloe church will be seen through the Wide Open, bearing N.W. by W. $\frac{1}{2}$ W. (view N.), and Outchester tower is in line with Waren house, S.S.W. $\frac{3}{4}$ W. (view M.); in this position there is from 5 to 6 fathoms water, over sand.

From the Northward.—A vessel drawing 10 feet water, driven near Emmanuel head, and thereby forced to take the inner passage between the Plough and the island, may, if there is not sufficient water for her over the bar of Holy island harbour, proceed into Skate road by keeping the east end of Budle granary just open to the westward of Kettle Bottom hill, bearing S. $\frac{3}{4}$ W., till Kyloe church is seen through the Wide Open, N.W. by W. $\frac{1}{2}$ W. (view N.), where she may anchor in 5 fathoms on a sandy bottom.

Vessels may sail through Goldstone channel into Skate road by keeping the north-west chimney of Waren house, in line with Outchester tower, bearing S.S.W. $\frac{3}{4}$ W. (view M.), till Kyloe church is seen through the Wide Open, N.W. by W. $\frac{1}{2}$ W., and Longstone lighthouse bears E. by S. $\frac{3}{4}$ S. southerly.

From the Eastward.—Vessels that have cleared the Stiel and Guzzard, or when still farther to the eastward they have cleared Whirl rocks, Knavestone, and the north point of Longstone, may run into Skate road by edging away till Longstone lighthouse bears E. by S. $\frac{3}{4}$ S. southerly, and proceed in with it on that bearing till Farn high lighthouse bears S.E. $\frac{1}{4}$ S., when they may anchor.

Vessels drawing 10 feet water, and sailing from Skate road to Holy island harbour, should keep Kettle Bottom hill open to the east of Budle granary, bearing S. $\frac{3}{4}$°W., in order to clear the Bat, till the beacons on Old Law come in line, W. by N., and then proceed in.

Directions for Staples Sound.—Although Staples sound is one-third of a mile broad, the want of a distinct mark renders it an inconvenient passage, so that it is seldom used by vessels, unless they be compelled by a change of wind or other unforeseen circumstances to do so. If obliged to take it, special caution is necessary, not to steer for the *apparent* mid-channel between the Scarecrows and the Staples, for Bush and Knox reefs which show only at low-water, and the Islestone Shad with 9 feet over it, extend more than half-way across this opening, but to keep towards the east side. The mid-channel depth varies from 9 to 13 fathoms, shoaling pretty regularly on the western side to 5 fathoms, and on the other side to 7 fathoms, which latter depth will be found close to Gun reef. The direct mid-channel course is N. by W. $\frac{1}{4}$ W., and S. by E. $\frac{1}{4}$ E., and the tide streams set generally in the same directions.

From the Northward.—If the vessel be coming from the northward and unable to weather the Whirls, she may proceed through Staples sound by giving a berth of 2 cables to the north-west point of the Wamses, and then steering so as to round Gun reef and Gun rock: the latter shows at two hours' ebb, when it is a useful guide in passing through this channel; if, however, it is not in sight, the vessel must feel her way by the lead. When hauling out to seaward after passing the Sound, give Fang rock to the south-west of the Crumstone a good berth.

From the Southward.—In coming from the southward, after passing the Crumstone, keep well over on the east side of the channel near Staples island, so as to avoid the projecting points of Knox reef, which extend more than half-way across from the Scarecrows towards that island. The Bush and Islestone Shad are also dangerous rocks bounding the channel to the westward, but neither of them projects as far as Knox reef. On the Staples side lies Gun rock, which, if dry, is the best guide for this passage; otherwise, the vessel must, as before mentioned, feel her way by the lead. When Gun reef has been cleared, there will be no further obstruction in standing out to the northward between Glororum Shad and the Wamses; and if obliged to borrow towards them, or towards Islestone Shad, the marks for each of these shoals will be found at page 17.

From the Eastward.—In running towards Staples sound from the eastward, care must be observed to avoid the Crumstone and the Fang; then proceed as directed above. In a case of emergency, a safe passage

will be found between the Callers and Staples island by keeping the large house at Glororum (on the main) in line with St. Cuthbert tower on Farn island, bearing W. $\frac{2}{3}$ S.; Bamborough castle in line with the outer extremity of the Pinnacles of Staples island, which are steep, will also lead clear of the Callers in this cross channel; and by night, Farn high light, bearing W. by S., will lead through clear of the Callers, and until the sound is open.

TIDES.—Flood Stream.—Off Goswick, the flood stream is increased in strength along the high sandy shore by the water forced in by the outlying reefs; but when the extensive sand ridge becomes covered, this in-shore stream decreases in strength, for the flood stream through Holy island harbour, in advancing over Fenham flats, then meets the coast stream entering between the Snook and Beal point, which on springs happens about an hour and a half before high-water, or when the tide has risen 12 feet; and the united streams, being thus deflected from the coast, may be said to form a circuit of Holy island for a short interval before high-water.

On approaching Emmanuel head, the stream, from meeting many obstructions, increases in strength. That portion of it which passes inside the Plough, on reaching the bar turns in through Holy island harbour, and over Fenham flats. A middle portion takes the direction of Goldstone channel, and bends through Skate road; in passing out between Bamborough castle and Farn island it turns a little more to the eastward, and then pursues a S.S.E. course. Another portion takes the direction of Staples sound, where, owing to the contraction of the channel, it has a rate of 4 knots on springs, while the outer portion rushes over the Knavestone and Whirl rocks, causing turbulent ripplings and eddies which all vessels will do well to avoid.

Ebb Stream.—In advancing from the southward, the ebb stream follows much the same course as the flood, but in an inverted order. Being intercepted by the chain of islets which lies directly at right angles with its course, it rushes through all the openings, especially Staples sound, and to the east of the Longstone, after which it unites with the outer main stream, and pursues its northerly direction, marking its course by strong ripplings. Off the southern extremity of the Longstone, the rapidity of the ebb occasions a strong returning eddy.

CHAPTER II.

NORTH SUNDERLAND TO TYNEMOUTH.

VARIATION, from 19° 50′ to 19° 40′ West in 1882.

NORTH SUNDERLAND POINT, or the SNOOK, is a cliff about 30 feet high, having an extensive fore-shore of parallel ledges dipping to the southward.*

Grimstone, a detached rock, drying 3 feet at low-water springs, but not uncovering at neaps, lies immediately off it, with the point bearing W. ⅔ S., and at 2½ cables from the beach. It will be avoided by vessels hugging the land, or working up along shore, by keeping the west part of Greenhill farm, open to the north-eastward of Monkhouse, bearing N.W.



Greenhill farm, open of Monkhouse, N.W.

The Falls, a continuation of the ledges which front the shore, extend about one-third of a mile in a S.E. by E. ¾ E. direction from the Snook, having 12 feet upon their outer end, and 5 fathoms close outside.

Buoy.—A *red* nun buoy is placed in 6 fathoms at low-water, E. by N.½ N. half a cable from the extremity of the Falls, with the Grimstone bearing N.W. ¾ N., distant 2 cables; North Sunderland church steeple, a little to the northward of North Sunderland point, W. by N. ¾ N.; Dunstanborough castle, in line with Beadnel point, S. ¾ W.; Bamborough castle, N.N.W. ¾ W.; and Farn high lighthouse, North.

Previous to the buoy being placed here, vessels bound to the northward in scant offshore winds often got upon the Falls, deceived by the low ground to the southward of the Snook, and were it not that the rock shelves to the southward, such accidents would be attended with worse results.

When abreast the Falls, North Sunderland church is in line with the Snook. To clear the Falls and Grimstone passing to the north-eastward,

* *See* Admiralty chart of east coast of England, sheet VII., Hartlepool to St. Abbs head, with views, No. 1,192; scale, mile = 0·5 inch: also plan of North Sunderland harbour, No. 1,632; scale, mile=20·0 inches.

as well as the Car End near North Sunderland Sea-houses, keep the west part of Greenhill farm, open to the north-eastward of Monkhouse, bearing N.W., as mentioned above. The ruins of Dunstanborough castle kept open of Beadnel point, bearing S. by W., clears them passing to the eastward.

When in the neighbourhood of the Falls by night, keep outside the depth of 10 fathoms; or do not bring Farn high light to the northward of N. by W. ¼ W.

The COAST.—Red Brae is a dark-coloured, low, projecting cliff, 1¼ mile to the southward of the Snook; the coast between forms a deep bight fringed by sand-hills, the highest of which is about midway. The back ground rises to a moderate height a few miles inland, and the rounded mass of the Great Cheviot (2,670 feet) overtops all in the distance. The geological formation of the district from Berwick-on-Tweed to near Alnmouth is generally carboniferous limestone with coal, and intrusions of trap occur on the coast at Holy island, Bamborough, Dunstanborough, and Boulmer. The Cheviots are of porphyry.

Beadnel Point, half a mile beyond Red Brae, is low and of a wedge-like form, extending in an easterly direction, the strata, like those at the Falls, dipping abruptly to the southward. All the coast from the Snook to this point is foul for 3 cables off shore. The village of Beadnel, consisting of red-tiled houses, stands to the N.N.W., half a mile from the point; the taper spire of its church, showing above the wood which bounds the village eastward and westward, is a prominent object from the sea.

BEADNEL HARBOUR.—On the west side of Beadnel point is a large lime-kiln, with some red-tiled herring-houses near it. The harbour adjoins the lime-kiln on its west side; it is very small, and formed by a north pier and a south one, with an elbow now in ruin, and causing an accumulation of sand in the harbour; the bottom is freestone with 2 feet of silt over it, and the entrance is 57 feet wide. There are now only from 7 to 8 feet in it at high-water springs, but, being well protected by Beadnel point, there is little range in it except during south-easterly gales.

Trade.—The principal trade is in herrings and fishing stock. There is one branch pilot at Beadnel.

Rockets and lines are kept here for effecting communication with stranded vessels.

BEADNEL BAY extends from Beadnel point 1½ mile to Snook point, near Newton, off which is a projecting rocky ledge. Its shores are sandy and foul, several cars or ledges lying out some distance from the land.

Dicky Shad and **Newton Skere** are two rocky patches lying in the offing abreast Beadnel point. The former has 13 fathoms of water upon it, and 15 to 20 fathoms around it, and it lies with Beadnel point bearing W. $\frac{1}{4}$ N., distant 2 miles. Newton Skere, with 12 fathoms upon it, and 25 to 30 fathoms around it, lies with Beadnel point W. by N. $\frac{1}{4}$ N., $4\frac{1}{4}$ miles. There is a heavy break of the sea upon both of them in easterly gales.

Newton-by-the-Sea is a village of red-tiled houses on the top of the bank between the Snook and Newton point; within the latter is a conical hill with the coast-guard watch-house and flagstaff on its summit, a very plain object fron the sea.

The Owlets, with 7 feet upon them, are connected with the rocks on the south-west side of Newton point. Little Fills, with 9 feet upon it, lies adjacent. Fills is an extensive flat patch of rock, the highest part of it drying 9 feet. Emblestone, a massive ledge forms the south breakwater to Newton haven; it only partially covers. Out Car dries 12 feet, and lies a short distance to the southward of the Emblestone. Jenny Bells Car, within the Out Car, dries $11\frac{1}{2}$ feet. There are several other patches, but not deserving particular notice. The clearing mark for all these rocks is, Boulmer trees, or Howick bathing-house, kept open to the eastward of Dunstanborough point, bearing S. by W. $\frac{3}{4}$ W.

NEWTON ROCKS.—Abreast the Snook and Newton point are several outlying dangers; the Ice Car, E. $\frac{1}{4}$ S., one-quarter of a mile from Newton point, dries 4 feet; Snook ledge dries one-third of a mile out from the beach, with a few detached rocks about it; Whittingham Car, E. by N. $\frac{3}{4}$ N. 4 cables from the Snook, dries 3 feet; the Faggot, N.E. $\frac{1}{4}$ E., half a mile from Newton point, dries 2 feet; and it is also shoal a cable E. by S. $\frac{3}{4}$ S. from it; the outermost danger is the Barnyard, with 7 feet upon it at low-water springs, N.E. $\frac{1}{4}$ E., one-fifth of a mile from the Faggot.

Buoy.—A *black* nun buoy marks the outer extremity of these dangers; it lies in 7 fathoms at low-water, with Embleton church over the south part of Newton point, bearing S.W. $\frac{3}{4}$ W.; and North Sunderland point, open of Beadnel point, N. $\frac{1}{4}$ W. Should the buoy be out of place, the clearing marks for this cluster of dangers are, Bamborough castle, kept open to the eastward of Beadnel point, bearing N.N.W.; and Boulmer trees, or Howick bathing-house, kept open to the eastward of Dunstanborough point, bearing S. by W. $\frac{3}{4}$ W.

NEWTON HAVEN, an opening between the rocks, is formed by Emblestone and Fills ledges to the southward and eastward, and by

Newton point to the northward. It has from 11 to 12 feet in it at low-water, over a bottom of sand, but it is exposed to a heavy sea in strong winds from N.N.E. to East. About 30 fishing boats belong to the place, and the fishing village Newton Sea-houses stands close to the shore. Directly above it, and to the westward of the watch-house, is a row of coast-guard buildings. A plentiful supply of good water is near at hand.

Rockets, &c., for saving life from wrecks are kept here.

Directions.—In approaching Newton haven from the northward, keep Boulmer trees and Howick bathing-house open of Dunstanborough point, bearing S. by W. $\frac{3}{4}$ W., until Northstead farm (which stands on the outline, and N. $\frac{3}{4}$ E. half a mile from the village of Embleton) comes over the north part of the first opening in the sand-hills to the southward of the Sea-houses, bearing W. $\frac{1}{4}$ S. This gap may be easily known from its having a small cottage showing upon the south side of it, and when Dunstanborough castle passes the large notch in the Emblestone, bring Northstead farm into the centre of the gap, and anchor in 11 or 12 feet, sand.

If from the southward, use the Dunstanborough and Boulmer marks as above, until Snook point opens east of Newton point; keep them so, and when Northstead farm is upon the north side of the gap, proceed as before. In the case of a water-logged or disabled vessel, it is very possible to save life and property in Newton haven by a careful attention to these directions.

EMBLETON BAY.—The coast from Newton Sea-houses to Dunstanborough point is composed of sand-hills, some of them of considerable elevation. The back ground rises quickly behind them, and on its crest is the village of Embleton, the tower of its church showing above the trees. Embleton bay is a good stopping-place in off-shore winds, and is formed by the Out Car and Emblestone to the northward, and Dunstanborough point to the southward. The anchorage marks are, Heifer-law tower and trees in line with Dunstanstead, bearing W. by S. $\frac{1}{4}$ S.; and Beadnel church spire, open to the eastward of Newton point, N. $\frac{1}{4}$ W., in 6 to 8 fathoms, good holding-ground.



Dunstanborough castle; North tower, S.W., 1 mile.

DUNSTANBOROUGH CASTLE, a fine old ruin, and one of the most prominent objects upon the coast, stands upon the shelving point

of trap rock which forms the south boundary of Embleton bay. It is a noble relic of antiquity, probably of long standing, though not mentioned until the beginning of the fourteenth century. The portions of the castle now remaining are in detached masses, and from their resemblance are not inaptly termed by seamen the "Snags of Dunstanborough." They consist of the south wall, with circular and square towers; the north tower, and a portion of the east wall. The north side of the point is a perpendicular cliff, but on the east and south sides the surface shelves gradually down to the sea, and here the main defences of the castle were placed. Close to the extremity of the point is a detached half-tide rock, which a berth of a cable will clear.

CRASTER.—From Dunstanborough castle to Coolernose point, the coast is a sloping grassy bank, presenting the unusual feature of a cliff landward. In an opening about half-way along the bank is the village of Craster with its coast-guard station; on one point of bearing, Craster hall surrounded by wood shows through the gorge. The village is inhabited by fishermen, who derive some slight shelter for their cobles in its little bay by the protection afforded by two half-tide ledges called the Great and Little Cars, which skirt the shore to the northward and southward; but on the first appearance of heavy weather the fishermen are forced to take their boats to the neighbouring havens of Newton or Boulmer. There is an excellent supply of fresh water below the village.

Rocket apparatus for effecting communication with stranded vessels is in charge of the coast-guard.

Craster Skeres or Scars is the name given to several rocky patches lying abreast about 5 miles distant in the offing, with 12 to 14 fathoms upon them, and 20 to 30 fathoms around them; in stormy weather, the break of the sea shows their position.

The COAST from Coolernose point to Howick burn is rocky; in the foreground, Filshi craig (176 feet), Howick bathing-house and Sea-houses are prominent objects. In the background are Howick hall with its finely wooded domain, and the craig and tower of Ratcheugh (422 feet); trees, however, have now grown up so much about the latter object, that it is no longer readily discernible from sea.



Howick bathing-house, N.W., ¼ mile.

From Howick burn southward, the coast is low and sandy. Red hill is inappropriately named, for it is scarcely above the general level. Thence to Waw burn the sand-hills continue without interruption, and are succeeded by a grassy bank, which attains a higher elevation in Aln-

mouth Heugh. The most prominent objects are the village of Boulmer with a clump of trees at its west end, and a coast-guard flag-staff and a life-boat house a short distance to the southward; then the farm of Seaton, within Seaton point; and Foxton hall, with extensive out-buildings, and Marden, a small farm-house, both on the bank top between Seaton point and Alnmouth Heugh.

In this district the coast is fringed with projecting ledges and outlying dangers, extending in some places three-quarters of a mile from the land; and as the low character of the shore abreast adds to the evil, Boulmer, and its immediate vicinity, is considered the most dangerous portion of this coast, and it witnesses an annual loss of life and property due in too many instances to a reckless disregard of the proper marks for avoiding the dangers.

BOULMER BUSH, BOULMER STILE, &c.—Houghton Stile and Red End Stile lie north and south, close off Red hill point; and Boulmer Bush, a rock with 7½ feet upon it, lies abreast the village of Boulmer. Boulmer Stile, with 12 feet upon it, is half a mile to the south-east of Seaton point.

Buoy.—A *chequered black* and *white* nun buoy lies to the southward of Boulmer Stile, in 5 fathoms at low-water; with Spy-law trees (346 feet), upon an eminence on the south side of the vale of the Aln, over Marden farm, bearing W. by N.; Warkworth castle, open three times its breadth to the southward of Berling Car rocks, S.W. ¾ W.; Coquet lighthouse, S. by W. ¼ W.; and Ratcheugh tower, N.W.

ALNMOUTH ROCKS, uncovering at half-tide, lie under Marden farm, and two shoal patches are also abreast the latter; one, Seaton Shad, with 27 feet; and the other, a short distance to the north-east, with 21 feet upon it at low-water.

The clearing marks for the dangers in the vicinity of Boulmer are, Newton watch-house, seen open of the first brow within Dunstanborough castle, bearing North; or Cresswell hall, open to the eastward of Hauxley point, S. by W. ¾ W., (*see* view B. on chart No. 1,192,) which clears them all passing to the eastward. Spy-law trees, kept well open to the left of Marden farm, bearing W. ¾ N., clears Boulmer Stile on its south side.

Alnmouth rocks, directly under Marden farm, are more in the way of vessels working into and out of Alnmouth bay; to clear them, keep Warkworth castle, open to the south-eastward of Berling Car point, bearing S.W.

By night, keep Coquet *white* light in sight, and not to the southward of S. by W. ¼ W., when its colour changes from white to *red*; this clears them to the eastward. Another good mark is, Farn light, kept in sight

outside Dunstanborough castle, bearing N. ¼ E.; but care must be observed that Longstone light is not taken for it, as they both revolve. In misty weather, when the lights are not visible, keep outside the depth of 15 fathoms while abreast Boulmer.

Boulmer Haven is in reality a boat haven, though many vessels have saved themselves in it; it is a clear and rather extensive space within the trap rocks fronting Boulmer, with an entrance through them termed the Marrmouth. The depth in the haven at low-water varies from 4 to 8 feet. The Marrmouth is 120 feet wide, with 7 feet in it at low-water; two *white* beacons with triangular heads lead through it when kept in line, and the anchor should be let go when Warkworth castle touches Seaton point. The water is smooth inside, and vessels take no harm, as they lie on a bottom of clean sand.

A Life-Boat is placed here. Boulmer is also a rocket station.

ALNMOUTH BAY, extending from Seaton point to Coquet island, is 4 miles long and 1½ mile deep. Vessels bound southward usually work into it to escape the weight of the ebb, and *vice versâ;* but both in entering or quitting it, careful attention should be paid to the marks for clearing Alnmouth rocks and Boulmer Stile. Vessels waiting tide to enter Alnmouth, anchor in the north part of the bay, with Spy-law trees, open a little to the northward of Church hill, bearing N.W. by W. ¼ W.; and Warkworth castle and Berling Car point in line, S.W. ¼ S.; in 3 fathoms, sand.

The COAST from the Aln to the Coquet, is composed of sand-hills, the only interruption being Berling Car point, a rocky cliff 67 feet high, and a ledge extending from this point is the only foul ground upon the western shore of Alnmouth bay. A narrow band of millstone grit occurs between the limestone to the north and the coal measures to the south, which extend near to Tynemouth. From Spy Law, the back-ground gradually declines in height as it approaches the Coquet, and the surface is prettily divided by hedge trees; the most prominent objects are the farms of High Buston and Northfield, and the flat-topped plantation upon Shilbottle hill (573 feet), a little farther inland. Some new growths have sprung up on the north side of the old plantation and doubled its breadth: it is the southern and highest part which is referred to in the directions.

Fluke Bay, a small opening between Alnmouth rocks and the ledges off Seaton point, is used by the coasters as an anchorage in northerly winds; the marks for it are Spy-law trees, over Marden farm, bearing W. ¾ N.; and Ratcheugh tower, over the east brow of Waw burn, N.W. ¾ N.; in 3 to 4 fathoms, sand.

ALNMOUTH stands on the north side of the outlet of the river Aln, and at the foot of an eminence called Alnmouth Heugh. The principal buildings in the town are some lofty granaries, which stand in front of it on the sea side, and a chapel with a belfry near the coast-guard station on the point. A conspicuous barometric indicator has been placed by the Duke of Northumberland on the sea gable of the coast-guard houses.

Church hill (the site of a chapel and burial ground), though formerly joined to Alnmouth, is now an island, the river separating it from the town.

The RIVER ALN is subject to very heavy freshes in the winter season; there is also a considerable range into it when the sea does not break outside; but when it breaks, the range is less. In northerly gales a partial protection is afforded the entrance by the foul ground off Boulmer; E.S.E. gales send home the heaviest sea, but even then the Aln is not considered so dangerous as some neighbouring bars. There is a ford across the Aln passable at low-water; it is an artificial bank of large stones raised about 2 feet above the bed of the stream; it forms a dangerous and illegal obstruction in the harbour, and has been the cause of damage to vessels. The tide flows up to Lesbury, 3 miles above, and the river is navigable so far for large boats.

Harbour.—The lower reach of the river constitutes the harbour; the bottom is stiff clay with a coating of sand; there are from 11 to 12 feet in it and over the bar at high-water springs, but vessels lie aground at low-water.

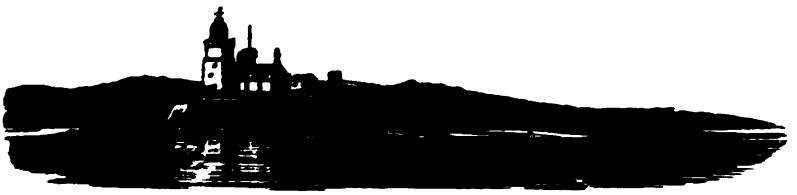
The channel, marked on each side by warping posts, is always best after a fresh, but as its width, as well as the position of the bar at the entrance, varies with every disturbing cause, no marks worthy of dependence can be given; the pilots, however, frequently examine the channel, mark it by small iron buoys, and are prompt in boarding vessels when required. There are no tide lights, except those the pilots exhibit for their own use.

Pilots.—There are two licensed pilots.

Alnmouth possesses many advantages as a watering-place, and Bilton station on the North-Eastern railway is at a convenient distance from it.

About seven vessels of various sizes belong to the place, which is a Creek of Shields Custom-house. The trade is principally imports of wood from America and the Baltic, slates from Wales, general cargoes from London, and patent and other manures; besides a small share in the herring fishery. A Vice-Consul is resident at Alnwick for Sweden and Norway. There is good spring water at hand; other supplies are abundant.

A Life-Boat is on the shore a short distance to the north-east of the village; and a supply of rockets and lines is kept at the coast-guard station, in case of shipwreck.



Coquet island.—Lighthouse, N. by W., ½ mile.

COQUET ISLAND lies two-thirds of a mile from the main land, and is elevated 35 feet above high-water. It extends in a N.N.E. and S.S.W. direction, 400 yards in length by 200 yards in breadth, but at low-water ledges dry out from it, which more than double its size.* It is the property of the Duke of Northumberland.

LIGHTS.—The tower of the old castle on the south-western side of Coquet island, was, by the permission of the noble proprietor, happily adapted as a lighthouse by the Trinity Board of London, in the year 1841. The light is *fixed, white,* and *brilliant,* when seen from the eastward between the bearings S. by W. ¼ W. and N. ½ E.; and *red* from S. by W. ¼ W. into the land to cover Boulmer Bush and Boulmer Stile rocks. It is placed 83 feet above high-water, and may be seen from sea 14 miles off in clear weather. A *dim* light is seen round the remainder of the circle.

A second light, 28 feet below the above light, and in the same tower, shows *white* between the bearings N.N.W. ¼ W. (2 cables outside Hauxley point buoy) and N. by W., and *red* between N. by W. and N. by E. ¼ E. over Bondicar Bush shoal; the lower light changes to *red* at Hauxley buoy. When the upper light is lost sight of, the line of Hauxley point and Bondicar Bush will have been passed, and while in the *red* light great caution is necessary in approaching the shore.

The DANGERS to the northward and westward of COQUET ISLAND are marked by the following buoys, which have their names painted on them.

N.E. Coquet, a conical buoy, *striped horizontally red* and *white,* with staff and triangle, in 8½ fathoms depth at low-water, marks the North Stile, which is the danger off the north-eastern extremity of the island. It lies with Morwick trees, open their own breadth north of Glo'ster hill farm, bearing W. ¾ N.; Cresswell hall, open a little to the eastward of the grassy

* *See* Admiralty plan of Coquet road and channel, No. 1,721; scale, mile=12·0 inches.

part of Coquet island, S.S.W. ¼ W.; and Coquet lighthouse, S.W. ¾ S. distant rather more than half a mile.

N.W. Coquet, *red* and *white chequered* can, lies in 12 feet at low-water, at the north-west extremity of the foul ground; with a clump of trees inland of Cresswell, shut in upon Bondicar point, bearing S.W.; Morwick trees, their own breadth south of Glo'ster hill farm, W. by N.; and Coquet lighthouse, S. ⅔ E.

Pan Bush, a *red* can buoy, in 3½ fathoms at low-water, lies upon the east side of the Pan Bush, a rocky shoal with as little as 3 feet upon it, abreast of and half a mile from the entrance to Warkworth harbour, and bounding the north channel to Coquet road to the westward; with Radcliff colliery chimney, in line with Amble Link house, bearing S.W.; and Spy-law trees, open a little to the eastward of Berling Car point, N.N.W. ½ W.

S.W. Coquet, a can buoy, *striped vertically red* and *white,* in 18 feet at low-water, marks the south-western extremity of the foul ground on the east side of Coquet or South channel; its marks are, the east end of Shilbottle trees, over the tower of Warkworth castle, bearing N.W. ¼ W.; and the east chimney of Hauxley Link house opening from behind Hauxley point, S.W.

Sand Spit, a *red* can buoy, in 9 feet at low-water, off the extremity of the rocks which continue in a north-easterly direction from Hauxley point, marking with Hauxley buoy, the west side of Coquet or South channel. It lies with Warkworth castle, in line with Pan point, bearing N.W. ¼ W.; and Bondicar house, just showing to the eastward of Hauxley point, S.W. ¾ S.; Hauxley buoy, S.S.E. ¼ E.; N.W. Coquet buoy, N.N.E. ½ E.; and Pan Bush buoy, N. ¾ W.

Bondicar Bush.—The mainland south of Coquet island is fronted by ledges and detached rocks extending off three-quarters of a mile; each ledge has a name, but the extreme dangers are Bondicar Bush, and Hauxley head; the former, on which many vessels have been lost, is an outlying rock abreast Bondicar point, with 6 feet upon it, and 7 fathoms close outside it, and must be carefully avoided by giving the shore a berth of one mile at least.

Buoy.—A *red* conical buoy lies in 8 fathoms at low-water, one cable east of the rock; with Brairdon hill over Bondicar house; Spy-law hill over Amble pier-head; Coquet lighthouse bearing N. ¼ E.; and Hauxley buoy, N. by E. ¾ E.

Off Hauxley point is a *red* conical buoy, with staff and globe, lying in 9 fathoms at low-water, 2 cables outside a steep rocky ledge which dries. It is placed with Earsdon windmill, in line with Bondicar point,

[illegible]

COQUET ROAD [illegible]

Directions.—[illegible]

If from the northward, pass to the eastward of Coquet island, giving it a berth of 3 cables, and do not shut Bondicar point behind the high-water mark of the island, until Morwick trees are open their own breadth to the northward of Pan point, bearing W. ½ N. This latter mark clears the North Stile, and when Coquet lighthouse bears S. ¼ E., a S.W. ¼ S. course leads to the anchorage as before.

Working in or out of this channel, stand towards the Pan Bush till the western portion of Hauxley trees is open its own breadth to the eastward of Tawnaway hill (the highest sand-hill between Pan and Hauxley points), bearing S.W. ¾ S.; and towards the island to the distance of 2 cables, keeping the lead going under all circumstances. Care must be observed while near the North Stile, as the flood sets strongly across it to the south-eastward.

If bound to Warkworth harbour from Coquet road, keep the western portion of Hauxley trees open its own breadth to the eastward of Tawnaway hill, bearing S.W. ¾ S., until the first clump of wood to the southward of Morwick trees is over the inner end of the north breakwater at Warkworth harbour, W. ¼ S. This mark leads to the northward of the Pan Bush, in 4 fathoms at low-water, and when the same division of Hauxley trees is seen to the westward of Tawnaway hill, bearing S. by W. ¾ W., the entrance to the harbour will lie on the best bearing for closing.

Coquet or South Channel into Coquet road, has the foul ground from the island to the eastward, and Hauxley rocks to the westward, and being less than one cable in width, with only 8 feet over a bottom of rock, should never be used except with a leading wind, and depth to spare, allowing for the lift of the sea. The marks for it are as follows—while closing from the southward, to clear Bondicar Bush and Hauxley head, keep Dunstanborough castle open to the eastward of Coquet island, about the breadth of the grassy part of the island, bearing N. $\frac{5}{8}$ E. (*see* view A. on chart No. 1,192), until the tower of Warkworth castle is in line with the house upon Pan point, bearing N.W. $\frac{1}{4}$ W.; keep this mark on until Hauxley link-house (red tiles) is observed shutting in behind Hauxley point, S.W. $\frac{1}{4}$ W.; Ratcheugh tower will then appear over Alnmouth Heugh, bearing N. by W. This latter mark leads through Coquet channel in the best water, leaving the S.W. Coquet buoy on the starboard hand, and the Spit buoy on the port hand; and when Shilbottle trees are open their own breadth to the northward of Warkworth castle, bearing N.W. $\frac{1}{2}$ W., steer in for the anchorage in Coquet road.

TIDES.—It is high-water, full and change, at 3h.; springs rise $14\frac{1}{2}$ feet, neaps 11 feet, and neaps range $7\frac{1}{2}$ feet. The stream of tide sets fairly through Coquet road and the South channel until half-flood, but more southerly as Hauxley and Bondicar rocks cover. The ebb sets fair, but with less strength than the flood. As before observed, the flood stream sets strongly to the south-eastward across the North Stile.

RIVER COQUET takes its rise in the western part of the county of Northumberland, and after a course of 37 miles through a hilly country and betwixt steep banks, has its outlet in the south-west corner of Alnmouth bay, washing the north side of Amble or Pan point. During the rainy season, the Coquet is subject to heavy floods, but at other times its volume below the town of Warkworth is inconsiderable.

Warkworth Castle.—The town of Warkworth stands on the right bank of the Coquet $1\frac{1}{3}$ mile above its outlet, a bend of the river nearly surrounding it. Very little of the town is visible from the sea, but the ruin of its noble castle, standing on an eminence directly above it, is a prominent object from every point of view, and very useful as a sea-mark. It was anciently a stronghold of the Percys, and parts of it in good preservation have been restored, but the date of its erection is unknown. It has an octagonal keep and projecting towers, and the summit of a small exploratory tower, which rises from the centre of the keep, is 172 feet above high-water. The outer walls extend to the southward, and inclose a considerable area; where entire, they are 36 feet in height.

WARKWORTH HARBOUR, formed by the lower reach of the river, remained in its natural state till 1850, when a company obtained an Act for its improvement. The works then begun have been carried on from time to time, but the promoters have had to contend with the natural difficulties of a small river in the dry season: a short and insufficient tidal reservoir, the tide only flowing up it one mile above the town of Warkworth; and the large tract of sand at and about its entrance. In addition to several rubble stone jetties for directing the course of the river, the works consist of a north and south breakwater piers, the former extending 500 yards E.N.E., and the latter 240 yards in a northerly direction, with an entrance between them 250 feet wide, facing E.N.E.; the bottom within and without is sea-sand, in places mixed with silt and farther up with gravel.

LIGHT.—A lighthouse stands upon the outer extremity of the south pier, whence a *fixed* light is exhibited at night when there is a depth of 10 feet on the bar: the light, which is elevated 55 feet above high-water, and should be visible in clear weather at the distance of 5 miles, is *white* southward of the bearing W. by N. ½ N., and *red* northward of that bearing: when the sea is too high to allow vessels to enter the light will not be shown.

A flag is exhibited by day from above the inner end of the south pier when there is 10 feet water at the entrance.

A beacon is also placed on the north pier-head.

There is a considerable range into the harbour at times, and, as before observed, the river is subject to heavy freshes; the worst sea at the entrance is in north-east gales, when nearly the whole of the space from the river to Coquet island is broken water.

Good water, and other supplies in moderate quantities, may be obtained at the village of Amble; the trade is confined to the export of coal, bricks, and building stone. A branch of the North-Eastern railway is brought down to the harbour. Population of Amble in 1881 was 1,888.

Steam-tugs and pilots are always in attendance on vessels entering or leaving the harbour.

Bar.—The bar, which formerly had only one foot depth on it at low-water, and 15½ feet at high-water springs; and, beginning at the end of the north breakwater, extended in a horseshoe form, 200 yards outside the entrance, and joined Pan rocks to the southward, has been somewhat reduced by dredging; and, by the same means, the entrance, as well as the channel of the harbour, has been improved in depth, vessels laden up to 16¼ feet having during the past year (1880) sailed from the port.*

* From a printed report of Messrs. Thomas Meik & Son, Civil Engineers, Engineers to the Warkworth Harbour Commissioners, August, 1880.

As the bar is subject to change, no marks worthy of dependence can be given, but, when practicable, vessels will be boarded by one of the resident pilots. Still, during heavy weather, and when a pilot cannot be obtained, and supposing a vessel to have cleared the dangers already described in the approach, the best plan is to close the harbour on a W.S.W. (southerly) bearing and enter between the lighthouse and the beacon which mark the pier-heads ; the channel within is then confined to the concave side of the rubblestone jetty up to Radcliff staiths, one-third of a mile within the entrance, where vessels can load.

Rocket apparatus is placed at Amble.

HAUXLEY.—From Pan point to Bondicar point, the coast is sandy and low; the village of Hauxley, a short distance within Hauxley point, has a good deal of wood about it, which shows in two distinct divisions on some points of bearing. Radcliff colliery (useful as a clearing mark) stands half a mile to the westward of the village, and may be easily known. Hauxley is entirely inhabited by fishermen, who have 21 boats, which they stow in a small opening between the rocks, called Hauxley haven.

A Life-Boat is stationed here, and also rocket apparatus.

The DANGERS abreast this section of coast, and the day mark to avoid them, have already been described on pages 35 to 37. In thick weather, go no nearer than 15 fathoms ; and at night do not bring Coquet light to the northward of N. by W. $\frac{1}{4}$ W. until 3 miles to the southward of it.

DRURIDGE BAY, extending from Bondicar to Cresswell, is 5 miles long by one mile deep; the shore is low and sandy, and the back-ground moderately high. The old castle of Widdrington, surrounded by wood, stands one mile back from the coast, and the peaks of Shaftham (1,004 feet), and Bradham (940 feet), with their steep northern faces, bound the view inland. In the south part of the bay, Cresswell point, low and rocky, the Sea-houses upon it, and the large modern mansion, Cresswell hall, in the midst of trees, a short distance within it, are all prominent objects.

A Life-Boat is stationed at Cresswell.

Northern Hill and White Bank.—The centre of Druridge bay is clean, but in the north part of it are two rocky patches, the Northern Hill and White bank, with 13 feet upon them, and 5 to 6 fathoms around them, lying one mile to the southward of Bondicar point; there are also two foul projections from the shore abreast, named Carstone and Hadstone skere.

[illegible]

Newbiggin village, a long mile to the westward of Newbiggin, stands high and surrounded by wood, and very little of it is visible from the sea; North Seaton colliery is a short distance to the south-west. The

shore abreast is rocky, and the Horse Bridge, a curious collection of boulder stones, stretches out nearly half a mile from the main. While working abreast, do not go nearer than 5 fathoms.

WANSBECK.—This river has a course of 24 miles; the entrance is narrow and obstructed by sand, but immediately within the breadth increases. The pilots have several beacons for leading in, which they shift as alterations occur. The northern side of the channel is bounded by a low training-wall of rubble, and there are two small quays on the south and one on the north side for the shipment of freestone from the neighbouring quarries, but this export has greatly fallen off. The coals from North Seaton colliery are shipped from a staith on the north side of the Wansbeck half a mile above Camboise; about 50 or 60 vessels enter for the purpose annually. Camboise is a village on the south side of the mouth of the river, having good spring water near it.

From Camboise to Blyth the coast is low and sandy, and several windmills and colliery chimneys are visible behind it.

A Life-Boat is placed a short distance to the southward of the Row Cars between Camboise and Blyth. There is also rocket apparatus.

BLYTH* stands on the south-west side of the river Blyth at its outlet. It is a place of some antiquity. Coals were first shipped here upwards of two hundred years ago, but the size of the town continued small till the close of the last century, when the opening of Cowpen colliery in its immediate neighbourhood caused an improvement in its trade and appearance.

There are no remarkable buildings visible from the sea, and the belfry of its church is scarcely seen above the roofs of the houses.

LIGHTS.—The principal objects are the two lighthouses at the south end of the town, built by the proprietor in 1788; they bear about N.N.W. and S.S.E., 148 yards from each other, and exhibit *fixed white* lights, respectively, 48 and 26 feet above high-water, only shown while there is 8 feet water over the bar; the high light is visible 11 miles, and the low light 7 miles, off in clear weather. By day a *blue* flag is hoisted upon the high lighthouse at tide-time to indicate the same depth of water.

There are two beacons with black diamond heads upon the sand-hills to the southward of the town for leading clear of Seaton Sea rocks; and another pair, of the same description, on Blyth snook, for leading up a portion of the improved channel from sea.

A Life-Boat is stationed near the high lighthouse, and rockets and lines are kept here in case of wreck.

* *See* Admiralty plan of Blyth, No. 1,626; scale, mile = 12 inches.

Docks, &c.—Blyth is faced on its north-east side by a stone quay upwards of half a mile long, on which are convenient loading drops, &c. At the high end of the town is a dry dock of the following dimensions:—

Length over all - - - - -	222 feet
„ on blocks - - - -	216 „
Width of entrance - - - -	32 „
Depth on sill at high-water of ordinary springs -	9½ „

There is also a floating dock which will receive a vessel of 400 tons. Iron ship-building is prosecuted. It has been proposed to form an extensive wet dock upon the west side of the entrance to the river.

The trade consists of exports of coal and salt; in 1880, 232,417 tons of coal were exported. Population in 1871 was 10,831. A Vice-Consul for France is resident.

Steam Tugs.—Three steam tugs belong to the harbour.

Supplies.—Water is led down to the quay, and can be supplied readily; marine stores of all kinds are abundant.

Pilots.—A pilot master and twelve pilots belong to Blyth.

BLYTH ROCKS.—Abreast, and to the southward of Blyth, are some extensive ledges and detached rocks, above and below water, the outermost being three-quarters of a mile from the main. Of the former character are the Row Cars, Crablaw rocks, Sow and Pigs (marked by a beacon at their eastern extremity), and Seaton Sea rocks; the last two are the southernmost, and farthest out. Of the latter description, are the North and South spits, with 12 and 14 feet, and the Knot with 11 feet over it. All these dangers will be cleared either in going to the northward or southward, by keeping the buildings of Tynemouth castle open their own breadth outside Hartley Bates, bearing S. ½ W. (*See* view C. on chart, sheet vii., No. 1,192.)

The RIVER BLYTH has a tortuous course of 37 miles; the lower portion of it towards the outlet constituting the harbour of Blyth; after passing the town, the river is conducted between the breakwaters along the inner face of Blyth rocks in a direction nearly parallel to the shore, and finally joins the sea three-quarters of a mile to the southward of the town.

In 1855, works were undertaken by the Blyth Harbour and Dock Company for the improvement of the entrance to Blyth. They consist of a double curved pier, or breakwater, 4,468 feet long, on the eastern side, the inner 1,800 feet of which is of stone, and the outer portion of 2,668 feet is formed of timber framing filled with loose stones; its extremity, resting on the west side of Beacon rock, is marked by a *white*

octagonal pillar. Upon the opposite, or western side of the entrance, is a breastwork 4,150 feet long, running parallel to the breakwater, and formed of piles, sheet piling, and planking; this work is marked at its outer extremity by a pole beacon and diamond, painted *black*, and afterwards at intervals by cross-shaped beacons to mark the work when it is submerged.

The channel thus bounded is from 100 to 120 yards in breadth, but above the town the river opens out into a wide expanse, and forms a considerable reservoir. The tidal flow ceases at the dam of Bedlington iron works, 3 miles above Blyth; the bottom is sand and shingle over indurated clay; it is very uneven, and considerable damage has occurred to vessels, owing to the imperfect character of the berthage on the south-west side of the harbour. When the last Admiralty survey of the port was made, in 1866, the bar had half a foot upon it at low-water of spring tides, and the depth in the channel varied from 2 to 4 feet up to the quays of the town; but since then dredging has been steadily prosecuted, new loading berths have been formed on the north-east side of the harbour, and the channel has been cleared of many obstructions. The port is used by vessels drawing 14 to 15 feet.*

Directions.— On approaching Blyth harbour the buildings of Tynemouth castle, open their own breadth to the eastward of Hartley Bates, bearing S. $\frac{1}{2}$ W., clears all Blyth rocks to the eastward. (*See* view C. on chart, sheet vii., No. 1,192.) The Link beacons in line, bearing N.W. by W. $\frac{7}{8}$ W., clears Seaton Sea rocks to the southward; then Blyth lighthouses in line, N.N.W., leads into the river between the entrance beacons and up the channel, which is on the west side, till the Snook beacons appear in line; these latter lead up to as far as abreast the low lighthouse, when the channel curves towards the east breakwater, and so continues up to the town. The range into the harbour is at times considerable, owing to the conducting effect of the breakwaters, but this has been partly remedied by lowering the central portion of the west breastwork, and converting the foreshore abreast into a wave-trap. In north-east gales, Blyth should not be attempted, on account of the broadside sea, the direction of the channel, and the streams of tide.

TIDES.—It is high-water, full and change, at Blyth, at 3h. 15m.; springs rise 15 feet, neaps 11 feet, and neaps range 7 feet.

The COAST, from Blyth to Seaton Sluice, nearly $2\frac{3}{4}$ miles, is low and sandy, and numerous colliery chimneys show within it. One mile

* The harbour-master states that the depth on the bar at low-water of spring tides is subject to considerable variation, but that the port is used, under favourable circumstances, by vessels drawing from 15 to 16 feet.

from Seaton Sluice is a high wooded knoll called Mile Hill, near which is an [illegible] spring of water, the Boiling Well, so named from its never freezing. A [illegible] the west of Seaton Delaval, with its [illegible] and [illegible] the [illegible] also showing above it.

SEATON SLUICE—The village of Seaton Sluice or Seaton [illegible] is built on the [illegible] of the [illegible] which are of limestone and [illegible] the north side of the village, a short distance W. by N. from it, [illegible] on a rocky part of the foreshore, and [illegible] land [illegible] the sea. Here [illegible] engine were erected, and the rest of the ground was converted into a sailing reservoir by the Seaton Delaval [illegible] the right of water. The [illegible] of the head of a small [illegible] which, after turning [illegible] the back of the harbour, [illegible] to be [illegible] to the sluice by which the tide is admitted, and the [illegible] to be destroyed. A new entrance was accordingly made by a new [illegible] which runs in an easterly direction through the solid rock. This entrance is 100 feet long, 40 feet wide, and 30 feet high: it is secured seaward by a double set of gates, and its direction is continued eastward by a pier of masonry, on the north side of which, 210 feet long: the opposite side of the entrance is marked by an iron perch. The old entrance, 50 feet wide, which was in use some years ago by an addition to its east pier, has become wrecked and choked up by sand.

The bridge for carrying the high road across the upper end of the harbour is fitted with sluice gates: the [illegible] of the harbour throughout dries at low-water springs, and is composed of rock with a covering of gravel. At high-water springs there is a depth of about 6 feet in the old entrance, and 14 feet in the new: there is [illegible] over the harbour for vessels drawing [illegible] 12 feet, and [illegible] twenty-six of various sizes. No tide-lights or signals are used, and marks for the harbour are not given, as it would be unsafe to attempt entrance without a pilot. Vessels waiting tide anchor with Mile hill bearing W. by N. ½ N. in 7 or 8 fathoms, sand. Seaton Sluice exports bottles.

Supplies.—Fresh water may be obtained at the Boiling Well, and other supplies at the village in moderate quantities.

A Rocket apparatus is provided at Seaton Sluice.

Seaton Road.—The bight from Seaton Sluice to Hartley Bates, distant about one mile, is sometimes termed Seaton road. It is encumbered with several dangers, viz., the Outer and Inner Bell, and Colville rocks; the former with 6 to 7 feet over them at low-water, the latter dries; the mark to clear them all is the same as that for Blyth rocks, the buildings of Tynemouth castle open their own breadth to the eastward of Hartley Bates, bearing S. ½ W.

The COAST, from the harbour of Seaton Sluice to the southward, is a rocky cliff of varying height. A short distance within, and on the summit of a gentle hill, is the village of Hartley, with red-tiled houses and no remarkable buildings; beneath the village, and directly off Curry point, is Hartley Bates, a small islet, with a row of cottages, and on which a chapel and hermitage formerly existed. It is 26 feet above high-water, and seated upon rocky ledges, which dry out from it for some distance at low-water. While working abreast, give it a berth of one-quarter of a mile.

From Curry point the coast is a moderately elevated bank with a sandy base, and ledges extend some distance in front of it. The villages of Earsdon and Monkseaton, the church of the former, with a tall tower, among trees, are prominent in the background. At Whitley lodge, a large mansion near the sea shore, the coast again appears as a rocky cliff, and continues so to Panarse point, which is low, with ledges projecting 2 cables from it. Within the point, upon a gently rising ground, stands the village of Whitley, and its spire-church, with Whitley park, a large mansion surrounded by wood, on the south side of it.

CULLERCOATES.—The village of Cullercoates, resorted to for sea-bathing, is upon the verge of the cliff, close to the southward of Panarse point. It is inhabited chiefly by fishermen. An opening in the rock serves as a boat haven, and two beacons on the top of the bank lead into it. A small breakwater has been built on its north side, to afford greater protection in gales from the northward.

A Life-Boat is placed here. Cullercoates is also a rocket station.

The COAST.—From Cullercoates, the coast is a steep grassy bank with a sandy foreshore, forming a small bay, bounded to the southward by the low point Sharpness, and the bold promontory Tynemouth rock.

BELLHUES ROCK, with 4 fathoms over it, and 7 fathoms between it and the shore, lies nearly one mile to the south-east of Cullercoates, with Tynemouth lighthouse bearing S.W. $\frac{1}{4}$ S., distant one mile.

The coast from Hartley Bates to Tynemouth rock is, with few exceptions, fronted by ledges, extending generally 2 cables from the main; therefore, whether running or working along it, go no nearer than half a mile.

CHAPTER III.

TYNEMOUTH TO FLAMBOROUGH HEAD.

VARIATION, from 19° 40′ to 18° 40′ West in 1882.

TYNEMOUTH HEAD, or ROCK, is a promontory of limestone 85 feet high, crowned by a lighthouse, the extensive remains of a priory, and a castle; it is conspicuous from every direction seaward, may be easily recognized by the mariner, and forms an excellent mark for the entrance to the Tyne.



Tynemouth lighthouse and priory.

LIGHT.—Tynemouth lighthouse stands at the eastern extremity of the castle yard, on the edge of the cliff; it is a white stone building 75 feet high, erected in 1802, and exhibits a *red* light of the first class, *revolving once every minute*, at an elevation of 154 feet above high-water, and is visible in clear weather from all directions seaward at the distance of 18 miles.

A short distance to the south-westward of the head, and separated from it by a small sandy bay named Priors haven, and upon a cliff of lower elevation, is the Spanish battery which commands the entrance; from this point, a high bank extends for half a mile to the westward, forming the northern boundary of the entrance to the Tyne.* On the summit of the bank, just to the north-west of the Spanish battery, stands the Collingwood monument, consisting of a full length figure upon a pedestal, altogether 70 feet in height. More to the westward, the railway station, the barracks, and

* *See* Admiralty plan of entrance to Tyne river, No. 1,934; scale, m = 11·8 inches.

the master mariners' asylum, are all prominent objects while entering the Tyne, and when approaching from the southward.

RIVER TYNE is formed by the streams of the North and South Tyne which unite near Hexham, and it has a course of about 36 miles in a general easterly direction to the sea at Tynemouth. Owing to the elevation of the sources in Cumberland and in the borders of Scotland, it is subject to sudden and great freshes, and discharges at such times an immense body of water.

SHIELDS.—The populous towns of North and South Shields extend along the banks on each side of the lower or sea reach of the Tyne. The higher parts of both towns are modern, but at the water side, old red-tiled houses, jetties of every shape and size, coal-staiths, tall chimneys, and cones of glass-works, may occasionally be distinguished between the masts of the tiers of shipping, and amid the dense cloud of smoke sent forth from the factories, the steam ferries, and the numerous steam tugs which are constantly in motion. Amidst such a scene of bustle and apparent confusion, it is often impossible to recognize the principal objects, which are Clifford fort, upon the sandy spit on the north side of the entrance, the Tyne light-houses, closely adjoining, and the disused Law beacons upon the opposite side.

TYNE LIGHTS.—The lower of the Tyne lighthouses stands on the sandy spit just to the westward of Clifford fort; it is a square tower of stone, 77 feet high, and its seaward face is painted white. The high light-house, similarly painted, stands upon the summit of the bank in front of Dockwray square, and its lantern is 123 feet above high-water. These lighthouses bear when in line W. $\frac{3}{4}$ N., are 240 yards apart, and each shows a *fixed white* light all night; by day, a *blue* flag is hoisted at the high lighthouse, except between half-ebb and low-water. The light-houses, open southerly, lead in the deepest water at the entrance between the piers.

Pilots.—In moderate weather there are always pilots to be found outside the Tyne, both to the northward and southward, and they have built for themselves a powerful steamer which enables them to keep the sea, and to render assistance to vessels in almost any weather.

DANGERS at the ENTRANCE to the TYNE.—Tyne bar, a ridge of sand, which formerly connected the Sparrow-hawk with the outer point of Herd sand, on the south side of the entrance, and over which, when in a mean state, there was a depth of only 6 to 7 feet at low-water, has been removed by dredging, and there is not less than 20 feet at low-water of ordinary springs in the channel from sea into Shields har-

bour.* By the same process several serious obstructions which encumbered Shields harbour, as the Stones, In sand, and Middle ground, Dortwick, Whitehill, and other sands, have been entirely removed, and now the river possesses an unobstructed channel from the sea for several miles within the entrance. Extensive dredging operations are still in progress with the view to obtaining further improvement in the depth up to Newcastle, and in the higher sections of the Tyne.

The Black Middens is the highest portion of the extensive rocky flat which lies out to the south-westward of the Spanish battery; the summit of it is always above water, and an iron perch with a skeleton ball stands a little within its south-eastern extremity. A detached rock to the south-westward of the Black Middens upon the side of the channel, and named the Priors Stone, is covered at 5½ feet flow. The remainder of the space between the Middens and Clifford fort is occupied by the Middle Scarp, a flat composed of gravel, sand, and mussel shells.

Herd Sand projects to the south-east from under the Law, and forms the southern boundary of the entrance to the Tyne. Its outer extremity is marked by a *black* nun buoy lying in 23 feet at low-water, and which must always be left on the port hand in entering.

Tyne Piers.—The great feature of the Tyne is the piers which are now being constructed on either side of its mouth; they were designed by the late James Walker, C.E., and were begun in 1856.

The north pier, formed by a submerged mass of rubblestone and a superstructure of longitudinal and cross walls of masonry filled in with concrete, is to be 2,900 feet in length, of which 2,472 feet is completed; it begins at the south angle of Tynemouth head, runs straight out in a S.E. ½ E. direction for 1,400 feet, and then curves easterly and southerly. The south pier, consisting for the most part of a mound of rubblestone with pitched slopes, is to be 5,400 feet in length, of which 4,495 feet is completed; it projects from the south shore, about midway along Herd sand, straight in an E.N.E. direction for 2,800 feet, then East for 1,500 feet, and afterwards curves northward. The submerged portion of each pier extends a considerable distance farther out.

The objects contemplated by these noble works are the maintenance of a deep water entrance channel, and the protection of it and of Shields harbour in on-shore gales.

A *red* buoy is placed in 5 fathoms at low-water, at the extremity of the works of the north pier, and a *red* and *white vertically striped* buoy lies in 5 fathoms off the end of the works of the south pier. These buoys

* From information furnished by Mr. P. J. Messent, M. Inst. C.E., Engineer to the Tyne Commission, February 1881.

are moved outwards with the advance of the base of the works in either case.

Shields Harbour.—The Narrows, abreast Clifford fort, and the most contracted portion of the entrance, is rather more than 1½ cable across at high-water; immediately within, the harbour of Shields expands to a breadth of nearly 2 cables, with depths of 5 to 6 fathoms over the greater portion of it. Seven sets of screw moorings have been laid down along the front of North Shields, extending from near the low lighthouse to the New quay; here occasionally 120 vessels are berthed, some waiting to fill up with coal, while others will be laden and waiting for a fair wind; as owing to both flood and ebb sweeping along this concave shore, a depth of 30 to 36 feet at low-water is maintained by the scour. A considerable range finds its way into Shields harbour at high-water in easterly gales,* and occasionally the freshes are very heavy, but the security afforded by the moorings will generally prevent damage, unless the tiers be overcrowded. Similar moorings are laid opposite South Shields, and at various positions throughout the river.

Docks.—Tyne Dock.—Jarrow Slake, a deep bight on the south side of the river, just above South Shields, had formerly an area of 350 acres uncovered at half-ebb, but 179 acres of the south-eastern portion of it are now occupied by the works of Tyne dock. This dock and its basin have an area of 60 acres; it has two entrances 60 and 80 feet wide, respectively, with a depth of 24½ feet over the sills at high-water springs. There are extensive timber ponds in the western portion of the Slake.

Northumberland Dock, with an area of 55 acres, and a tidal basin of 2 acres, is at Hay Hole, upon the opposite side of the river; it has two entrances at the eastern end, respectively, 52 and 70 feet in width, with a depth of 24 feet over the sills at high-water springs.

In addition to the facilities afforded for the shipment of coals at these docks, the Tyne Commissioners have erected staiths with adjustable shoots at Whitehill, alongside which the depth varies from 18 feet to 25 feet at low-water, and which could load into a ship, at high-water spring tides, having the combings of the hatchways 20 feet above the floating line, or at low-water with 15 feet greater height.

Coble Dene Dock.—A deep-water dock is in course of construction at Coble dene, between North Shields and Whitehill point; it will probably be opened in 1882.

* A groyne of a temporary character is now (1881) being constructed a short distance to eastward of the low lighthouse, for the purpose of reducing the range in the harbour, until the piers have been sufficiently advanced to afford the desired protection.

Graving Docks.—

	Length over all.	Length on blocks.	Width of entrance.	Depth on sill at high-water of ordinary springs.
	Feet.	Feet.	Feet.	Feet.
North Shields:				
E. Young & Co.	182	182	40	15
Laing Bros.	224	—	31	10
T. & W. Smith	300	300	60	17
St. Peter: W. B. McLearon	190	185	56	15
South Shields:				
W. E. Boutland	127	122	33½	12½
Moralee & Sons	166	166	33½	15½
Tyne Dock Engineering Co.	282	—	44½	15½
Metcalfe & Son	195	192	33½	13½
Middle Dock Co., No. 1	332	322	60	16
„ „ No. 2	285	275	42	17
J. Young	279	279	49	16
High Docks, Edwards & Sons, No. 1	330	315	48	18
„ „ „ No. 2	305	305	40	15
„ „ „ No. 3	430	430	50	21
J. Readhead & Co.	185	175	34	12
Jarrow: Palmer's Ship Building Co.	440	411½	70	18
Hebburn: Leslie & Co.	450	430	68	21

On both banks of the Tyne are numerous slipways which will receive vessels of from 200 to 3,000 tons; there are also several floating repairing docks, and gridirons.

The direction and length of the several reaches from Jarrow Slake to Newcastle bridge are as follows:—

Long reach extends W.N.W. for 2 miles above Jarrow Slake; then occurs Bill reach, running S.S.W. for 1½ mile. On rounding Bill point, a very sharp turn for long vessels, but which is being removed, St. Anthony reach opens out in a West direction for half a mile; afterwards follow Brandling reach, N.N.W., ¾ mile; St. Peter reach in a West and North-west direction for the same distance; Glasshouse reach, North for one mile; and lastly Newcastle reach; this runs about West to Newcastle bridge, which was formerly the limit to navigation to vessels with standing masts. The navigable channel through these various reaches has always been narrow, and was formerly much obstructed by shoals, but its condition has been greatly improved under the extensive dredging operations which have been carried out, and the abrupt turns in the course are to be modified by the reduction of several of the protruding points.

Bridges.—The old bridge connecting Newcastle with Gateshead, which has been removed, had nine arches, its abutments, piers, and starlings occupied 200 feet, or two-fifths of the waterway of the river, and the soffit, or head of the centre arch, was only 18 feet above the level of high-water. The new bridge, which was completed in 1876, has four

spaces, corresponding with those of the high-level bridge, a short distance westward, and is so constructed that the second and third openings, each of 104 feet, are spanned by girders that, by means of hydraulic power, are swung round on the central pier, and allow masted vessels to pass through. The weight of the swinging portion is 1,450 tons, and it is 281 feet in length.

A high-level bridge with two roadways, the upper carrying the North-Eastern railway across the river, and the lower for ordinary traffic, is a short distance westward of the swing bridge ; the under part of the lower roadway is about 83 feet above the level of high-water.

Redheugh bridge, a high-level road bridge, crosses the Tyne about half a mile farther westward, it has four river spaces, the two mid-spaces each measuring 236 feet, and there is a clear height of 87 feet from the high-water surface to the under part of the roadway.

NEWCASTLE-UPON-TYNE stands upon the sides and summits of the acclivities on the left bank of the river, 7 miles above Shields, and the town of Gateshead on the opposite side is similarly situated. The town presents a scene of great commercial activity ; its manufactures (the most important of which are of iron) are very extensive ; its public buildings are numerous, among which its fine Norman keep, the tower of St. Nicholas church, crowned by turrets and buttresses, and the elegant spire of All Saints church, are very prominent.

The Tyne exported, in 1880, 8,131,419 tons of coal and coke. Iron ship-building is a branch of trade which is rapidly increasing, while every description of repair, both of vessels and machinery, can be readily accomplished. Supplies of all sorts are abundant. The number of vessels belonging to the port of Newcastle on the 1st January 1881, was 502, of 200,281 tons ; but the aggregate number belonging to the Tyne was 1,030 vessels of 373,055 tons, constituting it the third in rank in the British isles. The arrivals in the Tyne ports in 1880 with cargoes and in ballast, coast-wise and foreign, were 17,187 vessels of 5,967,042 tons.

In 1879, the ruling (least) depth in the fair channel of the river from the entrance to Newcastle was, at low-water of spring tides, 20 feet ; and at high-water, 35 feet ; and from Newcastle to Elswick ordnance works on the north side, and to as far as Dunstan on the south side, the depths varied from 13 feet to 20 feet at low-water, or from 28 feet to 35 feet at high-water, of ordinary springs.

The quay at Newcastle extends for nearly one mile in front of the town, and, in 1879, the depth of water in the berthage alongside it was from 10 feet to 20 feet at low-water, and 25 feet to 35 feet at high-water, of ordinary springs. Rails in connection with the North-Eastern railway are laid along the quay. Ample warehouse accommodation is provided, as

well as every modern appliance for the rapid discharge and loading of vessels. Three of the cranes on the quay are capable of lifting, respectively, 20 tons, 60 tons, and 80 tons.

There are also warehouses and quays at Gateshead in connection with the railway system.

Population in 1881.—Tynemouth and North Shields, 43,863; South Shields, 56,922; Newcastle, 145,228; Gateshead, 65,873.

Life-Boats.—Five life-boats are kept in constant readiness at the entrance of the Tyne, as well as a plentiful supply of other apparatus for saving life. Greathead, the inventor of the life-boat, was a resident of South Shields, where he built his first boat in September 1789.

Directions.—Approaching the Tyne from the southward, keep Tynemouth lighthouse to the westward of N.W. ½ N., so as to clear the submerged portion of the south pier, and when Tyne lighthouses appear in line, bearing W. ⅔ N., proceed with them so, and they will lead in midway between the piers until Tynemouth light bears N.N.W., when Tyne high light must be gradually brought open to southward of the low light,* and the vessel be steered so as to pass in mid-channel between the Black Middens and the northern shore, and the rubble embankment, or inner pier, upon Herd sand, and on through the Narrows into Shields harbour, and having arrived up to abreast the New quay, or a little above it, an anchor may be let go, or a warp be run out to the moorings, as most convenient. Throughout this track there is not less than 20 feet at low-water. If closing the entrance from the northward, give Tynemouth castle and the Spanish battery a berth of over half a mile, until Tyne lighthouses appear in line; then proceed in as before directed.

Northerly gales cause the highest sea at the entrance, but there is no difficulty in taking it in winds from N.E. to S.E., provided the ebb has not made strongly.

CAUTION.—When the sea is high, endeavour to enter before the flood stream has ceased running. In N.N.E. and southerly gales, vessels should borrow close upon the *red* buoy off the end of the north pier, or the *red* and *white vertically striped* buoy at the end of the south pier works, as the case may be; and on arriving under the shelter of the piers, assistance will be obtained.

Lights.—Three lights, *green*, *white*, and *red*, vertical, are exhibited over the end of the superstructure of the north pier; and a *red* light on

* It is proposed to place a revolving light on the groyne or inner pier upon Herd sand, and to have a stop light on the north pier for the purpose of indicating the point within which the leading lights should be kept open to the southward.

the body of the north pier, kept under Tynemouth *revolving red* light, clears the south pier works. A skeleton globe is shown in place of this light by day.

TIDES.—It is high-water, full and change, at the entrance of the Tyne, at 3h. 20m.; springs rise 14¾ feet, neaps 11¼ feet, and neaps range 8 feet. At North Shields, springs rise 14¼ feet, and neaps range 8½ feet; at Newcastle quay, springs rise 15 feet, and neaps range 9 feet; and at Elswick works springs rise 15⅓ feet, and neaps range 9⅙ feet. The lift of a spring tide between Shields and Newcastle, as well as in the higher section of the river, has not only been considerably increased by the dredging operations, but high-water at Newcastle now occurs only 12 minutes later than at the entrance to Shields harbour, instead of one hour after, as was the case in 1858; and the difference in the time of high-water at Newcastle and at Newburn, 6 miles farther up, has been reduced from 29 minutes to 8 minutes.

The COAST to the southward of the Tyne is composed of sand-hills, but it changes to limestone at Trow point; within, the ground rises into a gentle hill, having the village of Westoe on its summit. Directly abreast Marsden house (which is whitewashed, with a slated roof), is a small inlet among the rocks, named Man haven. The coast hereabouts is cliff of soft magnesian limestone, from 50 to 60 feet in height, and the bold detached mass, Marsden rock, as well as many other rocks of varied size and form, serve to show the resistless action of the sea upon it. Ledges also skirt the whole shore, and a berth of one-quarter of a mile should be given it.

Marsden is a rocket station.

SOUTER POINT, between Man haven and Whitburn, shows prominently, whether approaching it from the northward or southward, and it serves to deflect the sea somewhat from Sunderland harbour in heavy northerly gales.

LIGHTS.—A circular white light-tower, 76 feet high, has been erected on Souter point: the light *revolves* showing a *white flash every half-minute,* is elevated 150 feet above high-water, and in clear weather should be seen from the distance of 20 miles. The illuminating apparatus is electric of the first order. A *fixed* light, also electric, is exhibited from the same tower, 21 feet below the revolving light, showing *white* from the bearings N. by W. to N. ⅓ E., and *red* from the latter bearing to N. by E. ¾ E. When the *fixed white* light is seen vessels will be in the line of Mill rock and Cope Carr point, and when it changes to *red* in that of Whitburn Stile, Hendon rock, and White Stones.

Fog Signal.—A powerful fog-horn is sounded in thick or foggy weather. The horn is situated seaward of the lighthouse, and gives *one* blast *every minute*, equally distributed through an arc of 180 degrees, viz., from N. ¼ E., through east, to S. ¼ W.

Cleadon hill, with a windmill on its west end, is immediately within Souter point. The village of Whitburn, with its church showing above the trees, stands a short distance back from the coast line to the southward of Cleadon hill.

A Life-Boat is stationed at Whitburn, and also rocket apparatus.

Mill Rock, with 18 feet water upon it, and 4 and 5 fathoms about it, lies abreast the village of Whitburn, and half a mile from the high-water margin, with the church bearing W. by N. ¾ N. The *fixed* light at Souter point shows *white* over this rock, and the sea breaks upon it in heavy weather. From Whitburn to Sunderland, the coast consists first of sand-hills, and then of limestone cliffs. The terrace at Roker is prominent upon the summit of the latter, a short distance to the northward of Sunderland harbour.

SUNDERLAND,* comprising the parishes of Sunderland, Bishop-wearmouth, Hendon, and Monkwearmouth, stands upon both banks of the river Wear, at its junction with the sea; the square towers and spires of its churches, the capacious warehouses at the south docks, some tall chimneys, and the lighthouses upon the piers, are among the principal objects noticed by the mariner; but, like Shields, the whole of the town is often obscured by a dense cloud of smoke. It is now the fourth port in the kingdom for tonnage, and till very recently it carried on ship-building to a greater extent than any other port in the British empire. In 1880, 3,573,483 tons of coal were shipped here. The exports, besides coal, are patent fuel, chemicals, paper, iron, glass, lime, &c.; timber, iron ore, esparto grass, grain, &c. are imported. In 1880, 456 vessels of 190,979 tons, belonged to the port; and 7,858 vessels registering 2,238,876 tons cleared from the port. Population in 1881 was 116,262.

Piers.—Sunderland piers were begun in 1720, and from various additions that have since been made, they now project out a considerable distance; they are built of substantial masonry, and are creditable to the spirit and perseverance of the port. The entrance between the piers is 126 yards in width, and its direction is east and west.

LIGHTS and SIGNALS.—North Pier Lights.—On the outer end of the North pier is a handsome stone lighthouse, painted white,

* *See* Admiralty plan of Sunderland, No. 1,627; scale, mile = 12 inches.

which, though 75 feet high, and weighing 338 tons, was removed bodily 150 yards from the former end of the pier to the position it now occupies, by Mr. Murray, a late resident engineer. It exhibits a *fixed white* light, which is 73 feet above high-water, and is visible in clear weather from 13 to 14 miles off; a *fixed red* light is also shown 18 feet lower in the same tower. Both lights are shown from sunset to sunrise throughout the year.

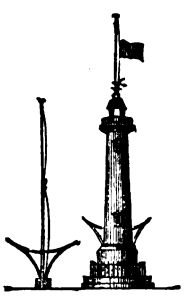
South Pier Lights.—From a white lighthouse near the South pier-head, a *white* tide-light, 58 feet above high-water, is exhibited from half-flood to first-quarter ebb—or while the wind and tide admit of entry, but it is put out at high-water in westerly winds. It illuminates seaward an arc of 130°, extending from the North pier lighthouse on the north to the South beacon on the South, and is regulated to appear of less brilliancy than the North pier light, but it should be visible in clear weather at the distance of 10 miles.

A *green* light shown under the tide-light at the South pier indicates that it is necessary to attend to orders hailed from the south pier. When blue lights are burnt at the same lighthouse, and no tide-light is shown, it is to denote that a vessel's entry would be attended with extreme danger.

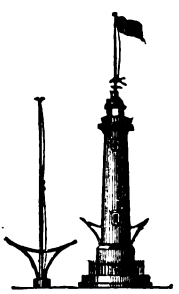
During the day, a *red* flag is hoisted half-mast high at this lighthouse, while there is a depth of 8 feet water upon the bar, and to the mast-head while there is 10 feet with a smooth sea. It is kept up till 1½ hour after high-water, when the wind is between N.N.E. and S.S.E., but is hauled down at high-water with westerly winds.

Fog Signal.—In foggy weather, a bell is sounded every quarter of an hour while the tide-light is exhibited, or the flag is hoisted.

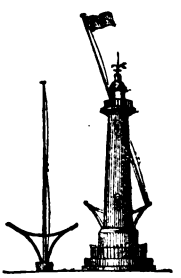
The following signals (as they appear from seaward) are made from the south lighthouse for the guidance of vessels taking the harbour in stormy weather, when it is impracticable to obtain a pilot.



Half-tide.



Safe for ships to enter. Also—in bad weather when no pilot is on board—You are coming in the channel.



Flag inclined to the South—Keep the ship more southerly.



Flag inclined to the North—Keep the ship more northerly.



Danger in the harbour; Be careful.



Entering will be attended with danger.

Upon the auxiliary flagstaff represented in the view, similar signals are made to vessels running for the harbour with risk after the lighthouse flag has been lowered.

During the progress of operations in the harbour, a red flag marked C.R.W., is shown upon the dredger or other vessel during the day, and a *red* light at night, and which all vessels must steer clear of.

Time Ball.—A large *black* ball is dropped daily (Sundays excepted), at one o'clock p.m., Greenwich mean time, at the staff surmounting the observatory of Messrs. Gowland, chronometer makers, High Street, Sunderland. The ball is raised at five minutes before, and falls at one o'clock precisely.

Life-Boats, &c.—Rockets and every appliance for saving life are kept in constant readiness upon both piers, and there are life-boats near the North and South piers, the South outlet, and at Whitburn.

Docks.—There are wet docks immediately within the entrance to the harbour, named according to their respective positions, North and South.

The North dock, at the inner end of the north pier, was opened in 1837, and is 6 acres in extent, with an average depth of 17 feet; the width of the entrance is 50 feet, and the sill is 20½ feet below high-water of ordinary springs; there is also a small tidal basin of 1½ acre. As originally constructed, a considerable amount of sea found its way into the basin and to the gates, but this defect has been partially remedied.

The South docks consist of the Hudson dock North, Hudson dock South, and Hendon dock.

Hudson dock North, opened in 1850, is within the beaching ground at the inner end of the south pier, and from its having been formed out of the low rocky foreshore, that was covered at high-water, to the southward of the harbour, is considered an engineering work of considerable merit: an extension of this dock, known as Hudson dock South, was completed in 1856. The tide harbour (entered from the river) is 2¾ acres in extent,

and is connected to the half-tide basin of 2½ acres within by Nos. 1 and 2 entrances, respectively, 45 and 60 feet in width; No. 3 entrance into the dock from the half-tide basin is 60 feet wide, and the sills of Nos. 1 and 3 entrances are 20½ feet, and the sill of No. 2 entrance is 23 feet, below high-water of ordinary spring tides. The dock has an area of 33 acres, with a depth in it of about 24 feet at high-water springs.

Hendon dock, of 11 acres, opened in 1868, is to southward of Hudson dock, with which it is connected by an entrance 60 feet wide, and having a depth over the sill of 23½ feet at high-water of ordinary spring-tides; it is also entered direct from the South Outlet, through Hendon channel, the eastern entrance being 60 feet wide, with a depth of 26½ feet over the sill at high-water of ordinary springs. The depth of water in this dock is 29 feet at high-water of ordinary springs.

South Outlet.—The seaward entrance to the southern docks, known as the South Outlet, was opened in 1856, it is upwards of three-quarters of a mile to southward of the entrance of the river, and is formed by break-water piers which project E. by N. ¾ N. and S.S.E., and embrace an area of 28 acres, the width between the pier heads being 220 feet. The channel, which has at present (February 1881) a depth of 26½ feet* at high-water of ordinary springs, but is being further deepened, leads up to a lock 481 feet in length between the gates by 90 feet in width, fitted with gates which are worked by hydraulic power and have a clear opening of 65 feet. There is a depth of 27 feet over the outer sill, and 30 feet in the lock, at high-water of ordinary springs. The entrance connecting the lock with Hudson dock is 65 feet wide, has 25½ feet over the sill, and is crossed by an iron swing-bridge, over which may be conveyed the heaviest marine engines and boilers.

Signals.—The following signals are shown from the semaphore signal-post on the north side of the outer roundhead of the lock :—

—	Day Signals.	Night Signals.
No. 1. The passage through the lock into the dock is open.	Two raised arms at the mast-head.	Two white lights one above the other, on the mast.
2. Vessels may enter lock from sea.	One raised arm at the mast-head.	White light with red light below, on the mast.
3. Vessels are about to pass out to sea.	One drooping arm at the mast-head.	Red light with green below, on the mast.

* This and other information has been supplied by Mr. H. H. Wake, M. Inst. C.E., Engineer to the River Wear Commissioners.

——	Day Signals.	Night Signals.
4. The gates are not yet open.	Arms down.	Two red lights, one above the other, on the mast.
5. Vessels entering from sea must pass up Hendon dock channel.	Two drooping arms on the mast.	Two green lights, one above the other, on the mast.
6. No vessel can be allowed to enter the lock or docks this tide.	Black ball on the mast-head.	Three red lights on the mast.

N.B.—No signals will be given for vessels to enter from sea unless there be 15 feet water or upwards on the sills of the outer gateway of the lock.

Before permission can be given to vessels to enter from sea, one or other of the following signals must be made by them, as the case may be, viz. :—

——	Day Signals.	Night Signals.
To enter the dock - -	Ensign hoisted at the maintop-gallant mast-head.	Green light under the mast-head light.
To enter the lock - -	Jack under the ensign -	Red light under the mast-head light.

Graving Docks.—There are six graving docks of the following dimensions:—

	Length over all.	Length on blocks.	Width of entrance.	Depth on sill at high-water of ordinary springs.
	Feet.	Feet.	Feet.	Feet.
Commissioners, No. 1 - -	427	400	45	$16\frac{1}{2}$
,, No. 2 - -	255	255	60	$16\frac{1}{2}$
Wear - - - - -	300	295	45	15
Bridge - - - -	270	—	50	14
Deptford - - - -	305	300	45	15
Cornhill - - -	400	390	45	$16\frac{1}{4}$

The Strand slip will take up vessels of 1,200 tons gross register and of about 800 tons dead weight.

The total water space of the South docks, &c., amounts to 78 acres 3 roods 21 perches; and the length of quayage to upwards of 10,000 feet.

The masting sheers at Hudson dock South are equal to lift 60 tons through 70 feet; and those at Hendon dock, 50 tons through 50 feet. There are also steam and hydraulic cranes for loading and discharging cargoes.

There are three warehouses at Hudson dock for storing grain, which will each hold from 10,000 to 12,000 quarters ; also sheds for esparto grass and general goods, and large cattle lairs.

Rails are laid round the docks which are in connection with the general railways.

The North-Eastern engine works, for the construction and repair of steam machinery, occupy a large space on the east side of Hudson dock: there are the necessary appliances for removing the built-up engines from the works and placing them entire on board ships in the dock.

Hendon Rock and White Stones.—Both north and south of the entrance to Sunderland harbour extensive ledges project from the shore marked at their outer ends by beacons. There are also two detached rocks to the southward in the offing abreast Hendon, which are greatly in the way of vessels approaching the harbour. Hendon rock, the northern of the two, has 5 feet upon it at low-water, and lies with the North pier light-house bearing N.N.W. $\frac{1}{4}$ W., distant $1\frac{1}{3}$ mile; its position is marked by a *black* buoy, lying in 18 feet at low-water, with Humbleton trees just opening south of White house, bearing W. $\frac{1}{4}$ N.; and Fulwell windmill, in line with the South beacon, N.W. by N. The White Stones, with 10 feet upon them at low-water, are S. $\frac{3}{4}$ W. nearly six-tenths of a mile from Hendon rock. These dangers are covered by the *red* sector of Souter point lower fixed light.

Five *red* buoys lie outside the roadstead, in 10 fathoms at low-water, to define the boundary within which vessels are prohibited from casting ballast.

RIVER WEAR, of which Sunderland harbour is the outlet, is a narrow and rapid stream, 65 miles long, and confined, for the greater part of its course, between high banks of limestone rock. Draining as it does a considerable surface of hilly country, the land floods often descend with great force, and, at times, when there has been ice in the river, they have caused serious damage to the shipping. Property to the amount of 15,000*l.* was thus destroyed in the course of a few hours in 1841, owing to the want of proper moorings, a defect which has since been remedied.

The Bar is generally half a cable outside the pier-heads, and, when in a mean state, has 3 feet over it at low-water ; the depth, however, varies between 2 and 4 feet. The deepest channel is usually about 20 yards from the face of the north pier, continuing seaward over the bar in an easterly direction, but it is occasionally forced to the southward or northward, according to the prevailing wind and sea.

The Potatoe Garth, a large expanse on the north side of the river immediately above the North dock, is valuable as a beaching ground, and

stilling basin. Above the Garth the river is very contracted, the average width being less than 130 yards. Its direction is S.W. ¾ W. for a short distance, and then W. by N. ¾ N., and the shipping are moored in close tiers on both sides, leaving but a narrow waterway between them. In many of the berths they lie aground at low-water, upon a hard and irregular bottom.

Bridges.—One mile from the pier-heads the Wear is crossed by a cast-iron bridge, which was erected towards the close of last century, and was long one of the engineering wonders of the country. Its single arch has a span of 236 feet, resting upon abutments of solid masonry, the crown of the arch being 80 feet above high-water: vessels of considerable burden pass under it with their top-gallant masts struck. It was strengthened and improved in 1858.

A short distance to the westward is a high-level bowstring girder bridge of the North-Eastern railway; this bridge has a span of 300 feet, and has a clear height of 81½ feet above high-water of ordinary spring tides.

The river continues narrow and winding for 1¼ mile above the bridges; its width then increases considerably, and the greater portion of its bed dries at low-water; at Hylton, 1½ mile farther, the river again becomes narrow, and so continues for the remainder of its tidal course.

On the banks of the river are extensive ship-building yards, rolling mills, glass works, paper mills, and three large marine engine works which have 80-ton sheers for putting the engines in a completed state into vessels.

Pilots and Steam Tugs are constantly in attendance outside the harbour in moderate weather.

Directions.—In approaching Sunderland harbour from the southward, keep Monk Heselden windmill well open of Hawthorn point, bearing S. by W. ¾ W., to clear the White Stones and Hendon rock; Cleadon windmill, open to the eastward of Bent house, N. by W., leads to the eastward of them. Bent house has a red-tiled roof, and is the first house upon the shore to the northward of Roker cliff, but as this mark is distant, and often obscured by smoke, a better plan to clear both rocks on the outside is to keep the North pier lighthouse to the westward of N.W. ¼ W., and they will have been passed when Building hill, near Sunderland, appears open to the northward of the score at Hendon, bearing W. ¾ N. In approaching the bar from the northward, keep the North pier lighthouse to the westward of S.W.

There is no difficulty in entering Sunderland harbour, wind and tide permitting, nor even in strong easterly winds, if the vessel's steerage can be depended upon. The usual plan is to close the North pier on a W. ¼ S. bearing, in order to avoid the rocks to the northward and southward, the extremities of which are marked by beacons; afterwards, to keep within

20 yards, or thereabouts, of the North pier, and when abreast the North dock basin, a course may be shaped for mid-channel and up to the berthage.

CAUTION.—The harbour is exposed in winds from N.N.E., round easterly, to S.S.E., and gales from E.N.E. to E.S.E. send home the heaviest sea. In taking the harbour with the wind well to the N.E. or S.E., it is necessary to carry a good press of canvas, on account of the heavy sea across the entrance.

No vessel should attempt the harbour under sail with the wind to the southward of S.S.E., for she could not lay the course in, and an anchor would be of no use. Vessels entering during the flood, should round the North pier end closely, otherwise, as the tidal stream sets strongly across the mouth of the harbour, the danger would be incurred of being carried alongside the south pier.

TIDES.—It is high-water, full and change, at 3h. 22m.; ordinary springs rise at Sunderland pier 14½ feet, and neaps to 11 feet; neaps range 7¾ feet. Winds from N.N.W. to N.N.E. cause the highest floods and check the ebbs, while those from S.S.E. to S.S.W. depress the high-water and make low ebbs; the tidal flow reaches Biddock ford, 8 miles above the bar.

The COAST to the southward of Sunderland consists of grassy bank with a rocky base, intersected at Hendon, Ryhope, and Seaham by deep ravines, or "denes," as they are locally termed; and as the whole extent is fronted by ledges, projecting in places for some distance, a berth of half a mile should be given it. Tunstall Law, with a double summit, called the Maidens Paps (362 feet), and Warden Law (637 feet), a conical hill with a clump of wood and colliery chimney near its crest, are prominent in the background, while Old Seaham church and rectory surrounded by trees, are distinct objects on the north side of Seaham dene. The rectory is used as a clearing mark for Liddle Scars, foul ground to the southward of Seaham.

SEAHAM, as respects the town and harbour, had no existence a few years since, both having been formed by the late Marquis of Londonderry, the proprietor. At a spot devoid of the least natural capability, and presenting a barrier of limestone cliff 50 to 60 feet high, with straggling rocks at its foot, substantial piers and docks have been constructed and connected with the interior by railways. The docks are generally full of shipping, and the whole scene must be regarded as one of the most remarkable instances of private enterprise which the country can produce.*

* *See* Admiralty plan of Seaham harbour, No. 1,625; scale, mile = 17·6 inches.

The trade of Seaham is principally confined to the export of coal and glass bottles. 592,674 tons of coal were exported in 1880. 61 vessels belong to the place. Population 2,802 in 1871.

Harbour.—By means of piers combined with excavation, there have been formed an outer harbour of 4 acres; North wet dock of 3½ acres, South wet dock of 2¾ acres, and a Light harbour, or harbour for light draught vessels, of 3 acres, affording altogether accommodation for about 120 vessels. The outer harbour is formed by east and south piers, the opening between them being 115 feet in width, and facing the south; this harbour dries at low-water springs, but the channel through it is kept clear of accumulation by occasional sluicings from the wet docks. The South dock has a double set of gates, but the North dock has only a single set, defended by booms. There is no connection between these docks, an inconvenience which is greatly felt. The Light harbour adjoins the South wet dock to the southward. The width of the entrance to the North dock is 33 feet, South dock 32 feet, and Light harbour 40 feet; while the depth at high-water springs in the outer harbour is 15 feet, North dock 17 feet, South dock 16 feet, and Light harbour 12 to 13 feet. The latter dries at low-water springs, and the bottom throughout is limestone marl, with a coating of silt and sea sand.

LIGHTS and SIGNALS.—A handsome stone lighthouse, 58 feet high, stands upon Red-acre point, a bluff cliff on the north side of the entrance basin. The light, which was first shown in December 1844, is *white, fixed*, and 94 feet above high-water, and it may be seen 14 miles off in clear weather; there is also a *red* light *revolving every half-minute* in the same tower, 49 feet above high-water, and visible at the distance of 11 miles in clear weather. During night tides, when safe to enter, a *red* light is also shown from the South pier-head, and by day a *red* flag hoisted upon the flagstaff above the railway platform between the docks, answers the like purpose.

From the same flagstaff the following storm signals are made:



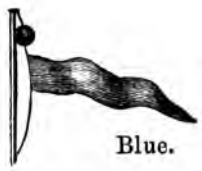
Tide Flag.
Red.

No vessel to attempt the harbour when this flag is not hoisted. At night, a *bright red* light is shown on the South pier as a tide signal, and no vessel must attempt the harbour when the light is not shown.



Blue.

Keep to windward until tide-time. Pilots and steam-boats will go off if practicable.



Blue.

Use your own discretion; there is no prospect at present of pilots or steam-boats getting off.



The harbour cannot be attempted. You had better make a port before dark.

Blue lights are burnt in the night-time when the harbour cannot be attempted.

A Life-Boat, rockets, and lines, are stationed at Seaham.

Patent Slip.—There is a patent slip adapted for vessels of 400 tons, and a gridiron 200 feet in length, in the Light harbour.

Liddle Scars, &c.—Seaham harbour is beset to the northward and southward by extensive rocky ledges, which partly dry at low-water, and there are also several detached sunken rocks to the southward named Liddle Scars, the outermost of which, the North Scar, having 3 feet upon it, is S.E. $\frac{3}{4}$ S. one-third of a mile from the East pier-head. Tangle rock, just to the southward of the harbour entrance, and separated by a clear space one cable wide from the East pier-head, is a continuation of the rocky foreshore, and just dries at low-water springs. Besides these, there are several rocky patches, with 7 to 11 feet over them, farther off-shore; the outermost of them, the North-east Bush, being nearly abreast Tangle rock.

Pilots.—Seaham maintains forty-eight pilots.

There are two steam tugs attached to the port; the signal for one being an ensign at the main mast-head by day, and one white light at the yard arm by night.

Directions.—Old Seaham rectory, seen to the eastward of Feather-stone rock, bearing N.W. by N., clears Liddle Scars in 10 feet at low-water, but in-shore of 7 feet on East Tangle rock; the safest plan, however, if closing from the southward, is to give the shore a berth of three-quarters

of a mile until the entrance has been brought to bear between W. by N. and West, the direction for approaching it. If from the northward, a vessel will be outside all the dangers by keeping half a mile from the shore, until the entrance bears as above. By night, do not go into a less depth than 8 fathoms, and steer for the light on the South pier-head when it bears W. by N. $\frac{3}{4}$ N.

E.S.E. gales cause the heaviest sea at the entrance, and with scant north-easterly gales it is difficult for a vessel under sail to fetch clear of the South pier-head. To guard against damage to the gates, no vessel is allowed to enter the port, under ordinary circumstances, except in charge of a pilot, but, in cases of emergency, when such assistance cannot be procured, care must be taken to luff short round the East pier-head, and then if the rope for checking the vessel's way be missed, the beach on the north side of the entrance basin may be taken.

The bottom in the offing is foul to the southward of the line of the entrance bearing W. $\frac{1}{4}$ S., a point which must be remembered when taking up an anchorage to wait tide-time, and there is also no protection except with off-shore winds.

TIDES.—It is high-water, full and change, at Seaham, at 3h. 24m.; springs rise 14½ feet, neaps 10½ feet, and neaps range 6½ feet.

The COAST to the southward of Seaham consists of cliffs from 70 to 90 feet in height, which, like those to the northward, are interrupted by denes; of these Hawthorn, Foxhole, and Castle Eden, are the most remarkable; some bottle works and blast furnaces are near the coast a short distance south of Seaham, while Kirby-hill tower (square and castellated), Hawthorn hall, Easington church, and Monk Heselden windmill, are all prominent objects. From the high land of Easington the back country declines in height towards Hartlepool; cliff ceases at Crimdon dene, and the coast then continues sandy for 2½ miles to the Heugh, the low rocky peninsula on which the town of Hartlepool stands. The shore is foul for a part of the distance, but a berth of half a mile will clear all dangers.

Blackhalls watch-house, standing near the shore midway between Castle Eden and Crimdon denes, is a rocket station.

HARTLEPOOL, situated upon a peninsula which projects boldly beyond the line of coast on either side, takes its name from a former pool, or inlet of the sea, 181 acres in extent, to the westward of the town. In ancient times it was a place of importance, having walls, bastions, and a fortified port belonging to the bishops of Durham, who kept their galleys in it. This harbour was entire 80 years since, but its site is now occupied by the Victoria dock. The most prominent buildings, as seen from the offing,

are the church, a noble structure said to have been erected by the Venerable Bede, the spires of other churches, and several factory chimneys.

In 1832, the decay of Hartlepool was so complete, that it had dwindled down to a small village containing a fishing population of a thousand souls, and only three vessels belonged to it; but owing to a judicious improvement of natural advantages, its advance has been rapid. It now possesses dock and harbour accommodation of 40 acres, 56 vessels of 26,161 tons belonged to the port on the 1st January 1881, and its population had increased to 12,684.

WEST HARTLEPOOL, situated upon the low shore between Hartlepool and the village of Stranton, has been altogether created within the last 35 years. At a spot offering little natural facility, a tide harbour and a series of wet docks have been excavated, with graving docks, coal staiths, warehouses, building yards, and timber ponds, and all the appliances of a first-class port.

The exports from Hartlepool harbours in 1880 consisted of 1,128,683 tons of coal and coke, besides cottons, carpets, woollens, silks, cement, iron, machinery, &c.; the principal imports are grain, timber, and general goods. Shipbuilding in iron and timber is carried on to a considerable extent, and 150 vessels of 100,171 tons belonged to West Hartlepool on the 1st January 1881. Population in 1881, 28,167.

Harbours, Docks, &c.—Up to 1835 the only harbour possessed by Hartlepool (if harbour it could be called,) was the space between the present lighthouse pier and the sea-wall of the town, as the slake or pool already alluded to was too shallow for the purpose; and vessels were moored to posts fixed along the pier, and exposed to all the drawbacks of such imperfect shelter. In 1832, attention having been called to the remarkable natural advantages belonging to the place, the Hartlepool Dock and Railway Company obtained an Act for the improvement of the port, and a tide-harbour was formed in the outer part of the slake, by carrying a mound, furnished with sluices, across it; the harbour, and a straight channel connecting it with the sea, which are kept clear by dredging, are defended eastward by the old pier, and westward by a rubblestone jetty. In 1838, further accommodation having become necessary to meet the increased trade of the port, the Victoria dock of 20 acres was excavated out of a tract of waste ground between the tide-harbour and the town, including the site of the ancient fortified port. An entrance lock, 43¾ feet wide, with its sill 5 feet below low-water springs, connects this dock with the tide-harbour.*

* *See* Admiralty plan of Hartlepool bay, No. 1,628; scale, mile = 14·7 inches.

Patent Slip.—There is a slipway in the East harbour which will accommodate a vessel of about 500 tons, and two hards.

The works at West Hartlepool consist of the West harbour of 41 acres, Coal or West dock of 8 acres, Jackson dock of 13½ acres, and Swainson dock, and Timber dock, of 12½ acres. The lock or entrance of Coal dock is 40¾ feet, of Jackson dock 58¾ feet, and of Swainson dock 48¾ feet in breadth, and all the sills are laid 5½ feet below low-water springs. Union dock of 8 acres, and Harrison dock of 13 acres, which are connected with each other, and with Jackson dock, occupy a portion of the site of the Slake. Union dock is entered from the West harbour through a half-tide basin, and Harrison dock from East Hartlepool tidal harbour by a lock 600 feet in length by 200 feet in width; the entrances to each are 60 feet wide; and, at low-water of ordinary spring tides, there is 10 feet on the sill of the north entrance, and 5½ feet on that of the south entrance. At high-water of ordinary springs, there is 26 feet depth of water in both docks, and in the lock, and 21½ feet in the south basin. Harrison dock was opened in 1880.

These docks and basins thus unite the previously existing docks and harbours at East and West Hartlepool.

Graving Docks.—There are three graving docks at West Hartlepool of the following dimensions:—

	In West harbour.	In Jackson dock.	In Swainson dock.
	Feet.	Feet.	Feet.
Extreme length - - -	315	385	360
Length on blocks - - -	308	340	325
Width of entrance - -	47	60	50
Depth on sill at high-water springs	15	15	16
„ „ neaps -	11	11	12

The Timber ponds cover 76 acres.

The sheer legs at West Hartlepool are constructed to lift 40 tons through a height of 40 feet.

A Breakwater, to assist in protecting Hartlepool bay from north-east gales, projects in a S. by E. ⅓ E. direction from the southern part of the Heugh. This work, of sandstone, with a hearting of concrete, which was originally 250 yards long between high and low-water, and with a parapet 20 feet above high-water of spring tides, is now (1881) being extended 200 yards farther out; the additional portion is formed entirely of concrete.

LIGHTS.—Heugh Lights.—A stone lighthouse stands upon the south-east extremity of the Heugh; the light from it, first shown in October

1847, is *fixed, white,* elevated 84 feet above high-water, and visible in clear weather at the distance of 15 miles from every direction seaward. A *fixed red* light is also shown 22 feet below the white light in the same tower, from half-flood to half-ebb, and by day, a *red* ball is hoisted upon the lighthouse flag-staff during the same interval of tide.

East Harbour Lights.—A *fixed red* light, at an elevation of 37 feet, in a wooden lighthouse at the end of the Old pier, marks the west extremity of the foul ground from the Heugh, as well as the entrance channel. A moveable flag-staff has been attached to this lighthouse for the purpose of guiding vessels, not having a pilot, that may run for the harbour in stormy weather; it being inclined to the right, or to the left, according as the vessel bears too far in the opposite direction, but it is kept perpendicular when she is steering the correct course.

Two *red* lights for leading up the cut at night, and bearing N. by W. ½ W. when in line, are shown near the dock office at the outer part of the East harbour.

West Harbour Lights.—A *fixed green* light is exhibited from the north pier-head of the West harbour from sunset to sunrise. Two *red* lights, bearing when in line N.W. ¼ N., and leading into the entrance, are shown when there is a depth of 10 feet into the West harbour, and the same depth by day is indicated by a *red* flag at the head of the north pier.

Signals at West Harbour.—No vessel to enter Jackson dock by day until a *red* ball is hoisted at the gaff-end of the flagstaff on the north side of the entrance to that dock, nor by night until a *red* light is shown on the south side of the entrance to that dock.

No vessel to enter the Coal dock by night until a *green* light is shown at the south side of the entrance to the dock.

Life-Boats, &c.—A life-boat is stationed on the sands ¾ mile north of the Heugh, two in the East harbour, one in the West harbour, and one near the brewery to the southward of West Hartlepool. There is besides rocket apparatus for saving life.

DANGERS in HARTLEPOOL BAY.—Several dangers bound the approach to Hartlepool harbour. The Heugh is bordered by a rocky foreshore 2 cables in width, the south-west extremity of which is marked by a beacon standing a little outside the Old pier.



Heugh beacon

The Stone, a detached rock having 2¼ feet over it, is off the south-east part of the Heugh.

Buoy.—A *black* conical buoy, surmounted by a wicker ball, is moored in 22 feet outside the Stone; from it, the Heugh lighthouse bears N. ¼ W.,

distant one-third of a mile; the lighthouse on the Old pier, N.W. by W., nearly half a mile; and the North pier-head of West Hartlepool harbour, W. $\frac{3}{8}$ N., three-quarters of a mile.

The Long Scar, upon the south side of Hartlepool bay, and forming its defence on that side, is an extensive ledge of rock projecting at right angles from the shore abreast Carr house.

Buoy, a *black* bell buoy, surmounted by a staff and globe, lies outside the Long Scar, in 22 feet; with the Heugh lighthouse bearing North, westerly, rather more than one mile distant; lighthouse on Old pier, N. by W. $\frac{3}{4}$ W.; north pier-head of West harbour, N.W. $\frac{1}{4}$ N.; and Seaton high lighthouse, open to the northward of Carr house, W. $\frac{1}{3}$ S.

Anchorage.—With the exceptions just noticed, the whole of Hartlepool bay is clear. The day marks for the anchorage are, Stranton church, in line with Newburn sailless windmill, bearing West; and Hartlepool church, N. $\frac{1}{3}$ W.; in 3 fathoms at low-water, muddy sand over clay. By night, anchor with the East harbour leading lights just open to the westward of the Old pier light, and the light upon the Heugh bearing between N. by E. $\frac{3}{4}$ E. and N.N.E. $\frac{3}{4}$ E.

Hartlepool Bar has been reduced by dredging, and the channel leading into the East harbour has a minimum depth, at low-water spring tides, seaward of the Old pier-head, of 11$\frac{1}{2}$ feet, and from thence up to the ferry of 12 feet; which depths it is proposed to increase by further dredging.* Owing to the judicious arrangement of the works, only a slight run finds its way into the harbour in strong winds from north-east and south-east. The outer portion of the channel is marked by two *black* buoys, the outer one carrying a staff and ball, to the eastward, and by three *white* buoys to the westward.

West Hartlepool Harbour has a plain approach, and the depth between the piers and in the entrance channel is from 4 to 5 feet at low-water springs. Like the other artificial harbours in its neighbourhood, easterly winds bring an addition to the silt, but the above depth is maintained by continual dredging.

Pilots for Hartlepool may always be obtained in moderate weather, and steam-tugs are in attendance at tide-time.

Directions.—In rounding the Heugh, give it a berth of one-third of a mile, then, to clear the Stone to the south-westward, should the buoy be out of place, keep the tall chimney of Middleton foundry, (on the west side of the tide harbour,) just open to the westward of the Old pier lighthouse,

* From information supplied by Mr. William Belk, Engineer to the Port and Harbour Commissioners, March 1881.

bearing N.W. ¼ W. Approaching from the southward, the Long Scar will be abreast when Seaton high lighthouse is seen over the low outbuildings on the north side of Carr house, bearing W. ¼ S., but while working near it, keep the Heugh lighthouse to the westward of N. ½ W. (the mark for clearing the Long Scar to the eastward,) and when Stranton church shows open to the northward of Newburn brewery, bearing W. by N. ½ N., the ledge will have been passed, and the bay may be entered. At night, to clear the Long Scar, the East harbour leading lights should not be brought to the westward of the Old pier light.

In fine weather, and with a leading wind, there is no difficulty in entering Hartlepool East harbour; pass between the *black* buoys and *white* buoys marking the channel, and when the light-posts near the dock office appear in line, N. by W. ½ W., keep them so, and proceed through the cut into the tide-harbour. By night, the Old pier *red* light bearing N.N.E., and the West harbour *green* light W. by N., mark the entrance of the channel, the course through which is N. by E. ¼ E. to abreast the Old pier light, when the Cut *red* lights in line, N. by W. ½ W., leads up to the harbour; but a stranger should not attempt to enter without a pilot.

A W. ½ N. course for three-quarters of a mile, leads from the buoy upon the Stone to the West harbour. The course in is N.W. ¼ N., and no special directions for entering are necessary, beyond the general caution to be observed in using harbours of this sort, viz., to keep sufficient canvas set, and have an anchor and warps ready. By night, keep the *red* leading lights in line, N.W. ¼ N., and the *green* light on the north pier-head on the starboard bow while entering.

REFUGE.—In the heaviest on-shore winds also, by waiting for the proper period of tide, there is nothing to prevent a vessel taking the East harbour, or at least getting into a position of safety, where a steamer will be able to take hold of her, tug-boats being always in attendance at tide-time. A vessel so circumstanced must pay attention to the direction of the flagstaff upon the Old pier lighthouse, pass just outside the buoy of the Stone, and then steer so as to pass midway between the beacon upon the Heugh rocks and the *black* buoy with staff and ball marking the channel, and a pilot will generally be able to board shortly after it has been passed. Should a vessel miss the entrance, or be unable from stress of weather to keep off until tide-time, the beach to the southward of the entrance may be taken, where life is always safe, and from whence the vessels also are generally got off.

CAUTION.—In north-easterly and easterly gales, loss has frequently resulted from vessels keeping so far outside the breach of the sea upon the Stone as to be unable to fetch up to a position where a steamer could take

hold of them; but this may be prevented by keeping close to the buoy as above directed.

TIDES.—It is high-water, full and change, at Hartlepool, at 3h. 28m.; springs rise 15 feet, neaps 11¾ feet, and neaps range 8 feet.

The COAST from Hartlepool to the Tees is composed of sand-hills, not more than 20 feet high. Adjoining West Hartlepool is the village of Stranton, with a tower-church, and two white windmills. Newburn sailless windmill, useful as a mark for clearing the Salt Scars near Redcar, is at the south end of West Hartlepool; the ridge upon which Hart windmill stands, and the small conical hill, named Elwick beacon, is based, forms a background to the whole.

SEATON CAREW, a pretty bathing village, stands upon the shore 1½ mile to the southward of West Hartlepool, the pinnacles of its church tower (the chief object) showing over the houses.

A Life-Boat and rocket apparatus are stationed here for the succour of vessels stranded at the mouth of the Tees.

LIGHTS.—Near Seaton Carew are the lights leading to the fairway buoy of the Tees, the high lighthouse being half a mile within the village, and the low lighthouse near its north end; they are white and stand 1,183 yards apart. The high light is *white;* the low light is *red;* they are, respectively, 89 and 34 feet above high-water, and both are *fixed.* When in line, bearing N.W. by W. ½ W., they clear the Salt Scars, as well as lead to the fairway buoy of the Tees.

The sandy coast terminates at the mouth of the Tees in a few detached hummocks named the Snook.

RIVER TEES, the divisional mark between the counties of Durham and Yorkshire, after a course of 85 miles, joins the sea at the head of Tees bay between Seaton Snook to the north-west, and Bran sand to the south-east.* To within 5 miles of its outlet, the river is narrow and winding, but the banks then recede from each other, and embrace a large basin more than 3 miles in width. This space is, for the most part, occupied by sand-banks that are uncovered at low-water, and through these, with varying direction and depth, and rather inclining towards the southern shore, the river pursues its course to the sea.

Up to the beginning of the present century, that portion of the Tees between the head of its wide estuary and the town of Stockton was very tortuous; but, since then, two cuts across some sharp bends of the river have shortened the distance from Stockton to the sea very considerably,

* *See* Admiralty plan of Tees bay, No. 2,567; scale, mile = 3·0 inches.

and thereby removed a cause of detention, while the estuary channel has also been materially improved. In the rainy season the freshes are strong, and convey down considerable quantities of sand and gravel.

North and South Gares.—The entrance to the Tees, confined between extensive banks of sand named the North and South Gares, was formerly, in common with nearly all rivers with sandy outlets where there are no artificial works to insure permanence, subject to every disturbing cause, and constantly varying in direction and depth. In 1855, however, the Tees Commissioners commenced extensive and important works. Low training-walls from Stockton to near the bar have been formed for fixing and deepening the channel, and breakwaters over the North and South Gares are also included in the general scheme of improvement. These several works are formed by the deposit of slag (the refuse from the blast furnaces,) and the training-walls are marked at intervals by beacons.

Breakwaters.—The breakwater on the eastern side of the entrance of the Tees, and known as the South Gare breakwater, was commenced in 1863; it extends from Tod point over the flat of Bran sand in a N. by W. ¾ W. direction, curving round to N.N.E. ½ E. to within a short distance of the bar. A temporary light is shown, but one of a permanent character is to be established when the head of the breakwater has been completed.

Fog Signal.—In thick or foggy weather, a steam whistle or buzzer, at the end of the breakwater, gives *two* short blasts *every half-minute.*

Slag has been deposited in the deeper water for the foundation of the North Gare breakwater.

Training Walls.—The half-tide training-wall on the eastern side of the channel terminates at the former position of No. 3 black and white chequered buoy (about eight cables within the bar buoy), and its extremity is marked by a circular beacon formed of concrete, surmounted by a staff and open bar gate and diamond.

The western training-wall has been carried out to abreast No. 2 black buoy, by which its submerged end is marked.

The Bar.—The least depth of water found on the bar at low-water springs is 14 feet, that being 5 feet greater than the depth in September 1873.*

BUOYS.—The following buoys mark the entrance to, and the channel of, the Tees.

* From information supplied by Mr. J. Fowler, M. Inst. C.E., Engineer to the Tees Conservancy, February 1881.

Fairway buoy, a large conical buoy, *striped black* and *white horizontally*, with staff and diamond, lies a fair berth outside the bar, in 5 fathoms; with Seaton lighthouses in line, bearing N.W. by W. ¼ W., and Fifth Buoy lighthouse and Seal lighthouse in line, S.W. ¼ W. Then the channel to as far as Fifth Buoy light is marked by four *black* can buoys on the starboard or North Gare side; and by the South Gare or bar buoy, a *chequered black* and *white* conical buoy, lying in 3 fathoms, and No. 1 *chequered black* and *white* can buoy, and then by beacons and Fourth Buoy light on the training-wall, on the port side.

Farther up, the channel, in addition to the beacons, is marked by a *black* can buoy on the western side, and by two *black* and *white chequered* can buoys on the eastern side, at places where shoal water extends beyond the training-walls.

The buoys are shifted immediately upon any change in the bar or channel occurring, but the foregoing description of relative positions and colour will always hold good.

The channel through the estuary of the Tees, to as far as Middlesborough, is well buoyed, beaconed, and lighted.

Stones.—The Stones, a ledge of rock extending obliquely and partly across the channel, 2½ miles within the bar, is marked by No. 6 *chequered black* and *white* buoy. The western extreme of this ledge has been reduced, and there is a depth of 14 feet at low-water in the fairway abreast.

LIGHTS.—Seaton lights in line, bearing N.W. by W. ¼ W., leads only to the Tees fairway-buoy, and not over the bar; this latter purpose is served by Fifth Buoy light and Seal light.

Fifth Buoy Light, a *fixed red* light, is exhibited, 26 feet above the water, from a red lighthouse upon the training-wall, about 1¾ mile within the bar, "Fifth Buoy Light" is painted on the bulwark.

Seal Light, a *fixed red* light, 42 feet above high-water, is exhibited from a building, painted red and white horizontally, upon Seal sand, and bears S.W. ¼ W. distant 1,200 yards from Fifth Buoy light.

Fourth Buoy Light, a *fixed green* light, is on the eastern training-wall N.E. by E. distant 3¼ cables from Fifth Buoy light.

Seventh Buoy Light, *fixed* and *white*, is also on the eastern training-wall 2 cables N.W. ¼ N. from the north extreme of the Stones. The remainder of the channel up to Middlesborough is marked by three *red* lights, and one *white* light.*

* One of the lighthouses formerly used for leading over the bar, is still standing upon Bran sand.

MIDDLESBOROUGH, 6 miles from the outlet of the Tees, and 4½ miles below Stockton, had, at the time of the extension of the Darlington and Stockton railway to it, in 1830, only one house; it is now a town possessing upward of 55,000 inhabitants, and is rapidly advancing. It was constituted a port in 1861. Ships of large tonnage are built here.

Dock.—The Gare dock at Middlesborough was opened in 1841; it is 12 acres in extent, and is approached from the main channel of the Tees by a cut one-quarter of a mile long; there are two locks 132 feet in length, and 30 and 58 feet in width; the depths on the sills at springs are, respectively, 18 feet and 22 feet 3 inches; and at neaps 15 feet and 19 feet 3 inches.

Graving Dock.—There is a graving dock of the following dimensions:—

Length from gates to head - - -	521 feet.
„ on the blocks - - - -	500 „
Width of entrance - - - -	50 „
Depth on sill at high-water of ordinary spring tides - - - - -	16½ „

Also, a slipway which will accommodate vessels up to 1,050 tons register. The sheer legs are capable of lifting 50 tons.

Since the discovery of the existence of iron-stone in the Cleveland hills, extensive iron manufactories have been established at, and in the neighbourhood of, Middlesborough; blast furnaces for smelting the ore are rapidly increasing in number, and this important discovery, taken in connection with its prolific coal fields, promises to convert the vale of Tees into one of the most populous and thriving districts of the north of England.

A Life-Boat is stationed at Middlesborough.

Port Clarence, a shipping place for the coal brought down by the Clarence railway before the traffic was diverted to the more convenient harbour of West Hartlepool, and where are several blast furnaces, is nearly opposite to Middlesborough. Railways connect Stockton with Port Clarence and Hartlepool, on the north side of the Tees, and with Middlesborough, Guisborough, Redcar, and Saltburn, on the south side.

STOCKTON, upon the left bank of Tees, about 11 miles from its outlet, is a place of considerable antiquity, and was at one time the residence of the bishops of Durham. Its trade has been principally with Holland, Hamburg, the Baltic, and British North America. On the completion of the railway connecting it with Darlington, in 1825, a coal trade was speedily established, but as the impediments of the navigation opposed effectual obstacles to an increase of traffic, the railway was extended, in 1830, to Middlesborough, and the coals were shipped from thence. The

Tees is crossed at Stockton by the first bridge. The manufactures are chiefly of linen and sailcloth, and iron shipbuilding is now carried on to some extent.

One hundred and thirty vessels of 32,936 register tons belonged to Stockton and Middlesborough on the 1st of January 1881.

In 1880, 187,714 tons of coal and coke were shipped on the Tees, and during the same year the arrivals were 4,748 vessels of 1,218,403 tons. Population of Stockton in 1881, 41,040.

Pilots for the Tees may be always obtained in the neighbourhood of Tees bay when the weather admits.

Steam-tugs.—Powerful steam-tugs are provided.

Directions.*—In approaching the bar of the Tees from the northward, keep Hartlepool Heugh lighthouse to the westward of N. by W., to clear the Long Scar, and to close the fairway-buoy; when Seaton high lighthouse appears well open to the southward of Carr house, the Long Scar will have been passed. If approaching from the southward, great care should be observed to avoid the Salt Scars abreast Redcar, for they project a considerable distance off shore. Elwick beacon, a small conical hill upon the same ridge as that on which Hart windmill stands, open to the northward of Seaton Carew, bearing N.W. $\frac{3}{4}$ W., or Seaton lighthouses in line, N.W. by W. $\frac{1}{4}$ W., leads outside the Salt Scars, which will have been passed when the monument to Captain Cook on Barnaby moor bears to the southward of S.W. $\frac{1}{2}$ S.; Seaton lighthouses kept in line will lead up to the fairway-buoy.

In proceeding across the bar, keep between the *black* buoys, marking the North Gare, and the *chequered black* and *white* buoys upon the South Gare, with Fifth Buoy lighthouse and Seal lighthouse in line, bearing S.W. $\frac{1}{4}$ W., and then between the *black* buoys, and the beacons marking the eastern training-wall, this leads in through the channel to as far as Fifth Buoy hole, where anchorage may be taken up, within 2 to 3 cables of Fifth Buoy lighthouse, in 4 or 5 fathoms at low-water.

At ordinary spring tides, the depth at high-water between the bar and Middlesborough is 24 feet, and from Middlesborough to Stockton 18 feet.†

By Night, having rounded Hartlepool Heugh at the distance of one-third of a mile, keep the light upon it to the westward of N. by W., until

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* In the opinion of experienced local shipmasters and pilots, the bar can be taken with safety, and vessels after crossing, are immediately under the shelter of the breakwater.

They also state that in gales from the North, the bar is sheltered by Hartlepool Heugh; and in north-east gales, heavier seas are frequently experienced outside than at the head of the bay, and ships put back into the Tees.—Originally published in *Hydrographic Notice, No. 7, of* 1879.

† From information furnished by Mr. J. Fowler, M. Inst. C.E., Engineer to the Tees Conservancy, February 1881.

Fifth Buoy light and Seal light have been brought in line bearing S.W. ¼ W. When Seaton high light bears W. ¾ N. the Long Scar will have been passed. From the southward, Seaton lights in line, bearing N.W. by W. ¼ W., will lead a clear berth outside the Salt Scars, and up to the fairway-buoy, where the Bar lights are in line.

CAUTION.—The glare from the numerous blast furnaces bordering the estuary of the Tees below Middlesborough is generally visible for a long distance seaward, and some care is necessary in distinguishing the lights used in the navigation of the Tees.

From the character of the entrance to the Tees, it should never be resorted to for shelter in an on-shore gale if it can by any possibility be avoided, and unless a vessel is deeply embayed, she may always fetch Hartlepool, which is a harbour of refuge under all circumstances when the tide is up. Tees bar is not so dangerous for crossing in a north-east gale, as in one from south-east, when the sea is upon the vessel's broadside, and to touch upon either of the Gares would be nearly certain destruction.

TIDES.—It is high-water, full and change, at Tees bar, at 3h. 45m., at Middlesborough at 3h. 55m., and at Stockton at 4h. 25m. Springs rise 15 feet at Tees bar, 13 feet at Middlesborough dock, and 11½ feet at Stockton bridge; and neaps rise 12¼ feet at the bar, 10¼ feet at Middlesborough, and 8½ feet at Stockton. The tidal flow extends 14 miles above Stockton.

REDCAR.—From the mouth of the Tees to the villages of Coatham and Redcar, which closely adjoin each other, the coast is low and sandy. There is a church with a spire at Coatham, and windmills at each end of the village. The tower of Redcar church shows a little above the houses. Behind are Barnaby and Burleigh moors, with arable slopes and wooded summits, patches of a brown colour here and there marking the extensive quarries of ironstone. A monument erected to the memory of Captain Cook is a prominent object at the north-west projection of the former hill.

Piers.—About 200 yards eastward of Coatham hotel, a pier, on piles, 600 yards in length, extends from the shore in a N. by E. ½ E. direction; its head is marked by a *fixed red* light.

Another pier, also on piles, and upwards of 400 yards long, projects in a N.E. by E. ¼ E. direction from abreast Redcar church.

A Life-Boat is stationed at Redcar, and rocket apparatus at Coatham.

SALT SCARS.—The Red Cars, or Salt Scars as they are commonly termed, are two remarkable rocky ledges abreast Coatham and Redcar, extending in an easterly direction nearly one mile from the main, and

parallel to each other; the Stones, across the channel of the Tees, is supposed to be a continuation of the same rocky feature. From the position and apparent character of the Salt Scars, the space between them has attracted attention as a site for a harbour of refuge, to prevent the annual loss of life and property which takes place in Tees bay.

Buoy.—A *black* can buoy lies off the outer extremity of these rocks, in 9 fathoms at low-water; with Cook monument, over Redcar south-east windmill, bearing S.W. $\frac{3}{4}$ W.; and Hart windmill, a little open to the northward of Newburn sailless windmill, N.W. $\frac{1}{2}$ N.

The Salt Scars will be abreast when Cook monument shows over Redcar church, bearing S.W. $\frac{3}{4}$ W.; and they will be cleared passing to the eastward, by keeping Hart windmill, open to the northward of Newburn sailless windmill, N.W. $\frac{1}{4}$ N.; or Elwick beacon, open to the northward of Seaton Carew, N.W. $\frac{3}{4}$ W.; or Easington church, standing upon the high outline north of Hartlepool, open to the eastward of Hartlepool Heugh, N.N.W. $\frac{3}{4}$ W. By night, they will be cleared by keeping Seaton lights in line, N.W. by W. $\frac{1}{4}$ W., and Hartlepool Heugh light to the westward of N.W. $\frac{3}{4}$ N.

SALTBURN-BY-THE-SEA, so named to distinguish it from the old village of a few houses upon the shore, and built a few years since for the accommodation of seaside visitors, stands upon a bank on the west side of a steep ravine, and has an imposing appearance from the sea. A large mansion half a mile up the wooded glen adjoining also appears on some points of view. A branch railway connects Saltburn with Redcar, Middlesborough, and Stockton. A coast-guard station stands upon the opposite bank.

The COAST from Redcar to Marske is sandy; very little of the latter village is seen from the sea, but its spire-church upon the bank-top close to the shore is a very plain object; and some houses of a superior description have lately been erected near the waterside.

The bottom is rocky and foul from the Salt Scars to abreast Marske, and one patch, named the High, with only 12 feet over it, lies upwards of one mile off shore.*

From Marske, the coast gradually increases in height to Saltburn.

A Life-Boat, rockets, and lines, are stationed at Saltburn.

HUNTCLIFF, one mile to the eastward of Saltburn, and the south-eastern boundary of Tees bay, is a bold cliff, 360 feet high, nearly perpendicular, and of a dark red colour: Beacon hill (549 feet), a rounded termination to the ridge, is seen a short distance back.

* *See* Admiralty chart of east coast of England, sheet VI.; Flamborough head to the Tees, with views, No. 1,191; scale, mile=0·5 inch.

CAUTION.—Several vessels have been lost upon the Salt Scars from mistaking Barnaby moor for Huntcliff.

Skinningrave.—At the head of a small bay between Huntcliff and Redcliff, at the mouth of a deep ravine, is the village of Skinningrave. The bay in front, named Skinningrave Wych, or Wick, is often used as an anchorage by small vessels in southerly winds; the best position is with Marske church, just open of Huntcliff, bearing N.W. by W. $\frac{3}{4}$ W., and the village of Skinningrave S.W. $\frac{1}{4}$ S., in 5 or 6 fathoms, clay.

REDCLIFF, S.E. $\frac{1}{2}$ E., $3\frac{1}{2}$ miles from Huntcliff, is one of the boldest features of the Yorkshire coast, being 666 feet above high-water; the extensive alum works of Boulby are upon its south-east slope, and there are several other works of a similar description near its summit: the refuse from these works is scattered over the face of the cliff, and being of a deep red colour, has probably given it its name. The shore between Huntcliff and Redcliff is foul for one-third of a mile off, and a corresponding berth must be given it; the same remark applies to the whole coast to nearly as far as Whitby.

Staiths, a fishing village, 2 miles from Redcliff, stands on the east side of a small creek, or beck; the ground behind rises steeply, and the village is besides so covered in by projecting cliffs, as to be visible from the sea only between a few points of bearing; the houses are generally red-tiled, and the flagstaff of a coast-guard station stands on the summit of the cliff upon the east side of the village. Between the two "steels" or ledges in front of Staiths, the fishing cobles belonging to the place find shelter in off and along-shore winds, but the want of a small breakwater, a work for which there is a convenient site, and which might be constructed at a moderate cost, has long been felt.

A Life-Boat and apparatus for saving life are placed at Staiths.

STAITHS OLD NAB, one-quarter of a mile to the south-eastward of the coast-guard flagstaff, is a low black cliff, and as it is the most advanced point of this line of coast, vessels bound to the coal ports usually take a departure from it. From Staiths Old Nab, Souter point bears N. by W. $\frac{3}{4}$ W., distant 32 miles; Hartlepool Heugh, N.W. $\frac{3}{4}$ N., $16\frac{1}{4}$ miles; Huntcliff, N.W. $\frac{1}{2}$ W., westerly, 6 miles; and Saltwick Nab, near Whitby, S.E. $\frac{3}{4}$ S., $7\frac{3}{4}$ miles.

Port Mulgrave, and Wreckhills, two small shipping places for ironstone, are between Staiths Old Nab and Runswick bay, and have their breakwaters partly wrecked by the sea. Port Mulgrave is particularly useful to the Staiths fishermen, who obtain shelter and accommodation for the general purposes of their fishery within it.

RUNSWICK BAY.—High cliffs of alum shale extend from Staiths Old Nab for 2 miles to the south-eastward to Runswick bay, which is skirted by grassy banks, and has a highly cultivated back-ground. The village of Runswick is in the north-west corner of the bay. Runswick bay is encumbered by sunken ledges, particularly off Kettleness, its south-eastern boundary. Small vessels anchor within Kettleness Steel in southerly and south-easterly winds, and in the body of the bay with north-westerly winds. Its apparent capacity has at various times drawn attention to it as a site for a refuge harbour, and its position, nearly midway between the Tyne and Humber, would give a peculiar value to such a work, but it is rendered all but impracticable by the foul and limited character of the bay.

Life-Boat.—Runswick is a life-boat station.

KETTLENESS and KELDER STEEL.—Kettleness, which is red and precipitous, and with some alum works upon it, is succeeded by cliffs of greater elevation to as far as the village of Sandsend, which stands at the mouth of a wooded vale. Kelder Steel, one mile to the northward of Sandsend-ness, projects one-third of a mile from the coast, and must be carefully guarded against. Huntcliff, or Redcliff, kept in sight outside of Staiths Nab clears both Kettleness and Kelder Steels; but a better mark from Runswick bay, and which clears Kelder Steel and Upgang rocks, and leads right into Whitby road, is Ling hill lighthouses, showing over the outer part of Saltwick Nab, bearing S.S.E. $\frac{1}{4}$ E. Lyth church and Mulgrave castle, the latter in a richly wooded domain, are prominent a short distance inland of Sandsend.

Rockets and lines are kept at Kettleness and Sandsend.

SANDSEND BAY, formed between Sandsend-ness and Upgang rocks, is a common anchorage in north-westerly winds for vessels bound to Whitby, or to the northward. The marks are, Mulgrave castle bearing from W. $\frac{1}{4}$ S. to W. by S. $\frac{1}{4}$ S., and Staiths Old Nab kept in sight, N.W. $\frac{3}{4}$ N., in 6 fathoms, sand over clay.

UPGANG ROCKS.—A broad sandy strand extends from Sandsend to Whitby; above it are steep banks and a bold diversified background, with Aislaby windmill and Sneeton castle on the outline. About midway to Whitby, Upgang rocks, with 5 feet over them, and 5 fathoms close outside them, extend for three-quarters of a mile from the main; they will be cleared passing to the eastward by keeping Staiths coast-guard flagstaff, which shows above and a little within the Old Nab, bearing N.W. $\frac{1}{2}$ N., or Staiths Old Nab a little open of Kettleness.

A Life-Boat is stationed at Upgang.

WHITBY, a town of considerable importance even at the period of the Norman conquest, occupies a beautiful position on both banks of the Esk, at its junction with the sea. The extensive ruins of its celebrated abbey of St. Hilda, upon the summit of the east cliff, its ancient church closely adjoining, and imposing modern terraces upon the west cliff, are the most notable buildings, and all are prominent from the sea.

The trade of Whitby is still of importance, though it has declined in several of its branches. Sixty years ago, Whitby sent eleven vessels, each with a crew of fifty men, to Greenland whale fishery, but since the year 1840, not a single whaler has sailed from the port; and the harbour revenue, which was aided by a passing toll till 1861, has been only sufficient for the maintenance and progressive improvement of the works. Coal is imported, principally from Hartlepool and Middlesborough. Freestone, for harbour and engineering purposes, is exported in considerable quantities from neighbouring quarries; alum is imported from adjacent works; and since the opening of the Whitby and Pickering branch of the North-Eastern railway, in 1833, ironstone has annually been exported, principally to the Tyne; an increasing supply of this material is being obtained. There are eight building slips, seven repairing docks, and one patent slip. The registered shipping of the port amounts to 178 vessels of 63,017 tons. In 1880, 907 vessels of 127,107 tons, entered Whitby harbour. Population in 1881, 14,014.

Supplies of all kinds are abundant, and water is led down to the quay-side.

PIERS and LIGHTS.—Whitby harbour is defended at its entrance by east and west piers; the latter was completed in 1814, and they will bear a fair comparison, both as regards appearance and strength, with any similar structures in the kingdom. Upon the west pier are two batteries, one for twelve and the other for eight guns; and a handsome stone light-tower, built in 1831, which stands upon its outer end, exhibits from two hours before to two hours after high-water, or whilst there is more than 8½ feet water on the bar, a *fixed green* light, elevated 83 feet above the sea, and visible at the distance of 10 miles in clear weather. By day, a *red* flag hoisted upon a staff in front of the terrace on the summit of the west cliff answers the same purpose.

The east pier extends in a N. by W. direction from the foot of the east cliff, from which it is separated by a small opening through which the force of the sea expends itself. This pier has been continued 325 feet in a N.N.E. direction to reduce the width of the entrance from 290 to 160 feet, as well as to prevent the existence of an eddy which proved a serious obstacle to vessels taking the harbour. A lighthouse on the head of this pier exhibits a *fixed red* light during the same periods of tide as that upon

the west pier; but the colour changes to *green* on a line a little to the northward of Whitby rock buoy, when the entrance into the harbour is between two *green* lights. The light is placed at an elevation of 54 feet above high-water, and may be seen in clear weather at the distance of 8 miles.

Life-Boats are kept in constant readiness on the west side of the harbour, besides the usual apparatus for saving life.

WHITBY ROCK.—The impediments in the approach to Whitby harbour are Upgang rocks, (already noticed at page 78,) and Whitby Scar and rock, lying off the east cliff.

Buoy.—A *black* bell buoy, with staff and globe, is moored near the outer extremity of Whitby rock, in 10 fathoms at low-water, with a red-tiled farm-house in High Whitby, over the outer part of Saltwick Nab, bearing S. by E.; and Tate-hill or Burgess pier-head, appearing midway in the harbour entrance, S. by W. ¾ W.; Ling hill lighthouses in line, S.S.E. The south lighthouse at Ling hill open east of the north lighthouse clears the Scar. The northern light changes to *red* over and in-shore of the Scar.

The Bar is a flat ledge of shale extending across the entrance between the piers, with more or less sand upon it, according to the prevailing winds; but since the lengthening of the east pier, the shale is laid bare, and there is now generally about one foot on the bar at low-water of ordinary springs.

Harbour.—Whitby harbour, comprising the lower portion of the Esk, is divided into outer and inner harbours; the former, 24 acres in extent, has in it three piers or jetties, namely, Scotch-head on the west side, and Tate-hill and Fish piers on the east side; built with a view of checking the inrun of the sea, which has always been one of the most serious evils of the port. The inner harbour is double the extent of the outer one, but has in it a large mud flat of 15 acres, called the Bell, which much reduces the waterway at low-water. It is the place of refuge in stormy weather, and 250 to 300 vessels can be conveniently berthed in it, for which purpose an ample supply of moorings, buoys, and posts have been provided. The bottom in the channel of both harbours consists of gravel, mud, and shale.

The swing-bridge connecting the two parts of the town, and forming the division between the harbours, was rebuilt in 1833; it spans a clear waterway 45 feet in width, and a *red* light towards the outer harbour, and a *green* light towards the inner harbour, on either side of the bridge, mark the passage by night. The following notice respecting it has been issued

by the harbour authorities, and should be carefully attended to, so as to avoid damage:—

"In dark tides a bell will be fixed on the lamp-post upon the east pillar of the bridge, which, when the passage is obstructed, will be rung, and the lamps reversed, so that the lights will not be seen below bridge. In this case no pilot, or other person having charge of a vessel, must attempt to approach the bridge from below, until the lamps are again reversed, the lights from them shown, and the bell rung a second time, to show that the passage is clear.

"The same signals will be made to vessels approaching the bridge from the inner harbour, in case of obstruction."

Each vessel passing through the bridge passage is subject to a charge of 1*s.* 6*d.*

During springs, vessels drawing from 15 to 16 feet may enter Whitby outer harbour, and those of 12 feet draught during neaps. The depth through the bridge passage into the inner harbour is only one foot less.

River Esk extends 16 miles above Whitby harbour, but as it drains a hilly country, the freshes discharged by it are often sudden and heavy, running through the bridge passage and between the piers at the rate of 5 miles an hour. In dry weather, the outward motion of the stream is scarcely perceptible. The tidal character of the river has been greatly curtailed by a dam at Ruswarp mill, 2½ miles within the bar; the tide rises during springs 3 or 4 feet at the dam, but does not extend beyond it, and the scour through the harbour is thus rendered nearly entirely dependent upon the land floods.

Pilots.—There are eleven pilots, under a master, and they may always be obtained in moderate weather.

Directions.—If approaching Whitby harbour from the northward, the marks for clearing Upgang rocks, given on page 78, must be attended to; if approaching from the south-eastward, Whitby rock will be in the way, and is cleared, passing to the eastward, by keeping the North cheek of Robin Hood bay open of High Whitby, bearing S. by E. ¾ E.; and passing to the north-westward by keeping Larpool house, standing amidst wood above the vale of Esk, over the entrance to the harbour, S.S.W.

Should boats not venture off, a vessel may safely run for the harbour if a *red* flag is hoisted upon the west cliff; but if a fire is lighted on the West pier-head, it is to be understood that the harbour should not be attempted.

Small vessels, of 10 feet draught, in winds from between S.S.E. and East, sometimes pass through the narrow sledway between Whitby rock and Scar, in order to avoid missing the entrance to the harbour; but this course should never be attempted except by those well acquainted with the

locality, as no marks can be given for it which a stranger would be able to recognize.

The entrance to the harbour must be kept bearing from S. ¾ W. to S. by W. ¾ W. while approaching it, and, in entering, the east pier must be kept close to, as the deepest water is upon that side. The channel within the entrance leads a little way to the eastward, and lies midway between Scotch-head and Tate-hill pier; it then follows the face of the quay on the west side, where the vessel's way must be checked; but if she has to enter the inner harbour, keep the sail set, proceed on, and the bridge will be opened.

Vessels waiting tide to enter the harbour, usually anchor in Sandsend bay with north-westerly winds; but in Whitby road, between Upgang rocks and Whitby rock, in those from south-eastward, with the West pier lighthouse bearing from S. ¼ E. to S. ¼ W., in 8 fathoms, mud.

By night, approaching from the southward, keep the southern Ling hill light open of the northern one, bearing S. by E. ¼ E., and then close the West pier light on a S. ¾ W. or S. by W. ¾ W. bearing, and having entered, proceed as before directed, and attend to the signals made at the bridge.

CAUTION.—It is necessary to remember while closing Whitby harbour, that the flood stream sets strongly to the eastward across Whitby rock, except when the sea breaks heavily upon it; then there is but little set through Whitby road.

Also, Whitby harbour should never be attempted in gales from North to N.E., for the sea then breaks a long way off shore, and renders the approach dangerous; under such circumstances, vessels will be warned off by a lighted barrel on the West pier, but if forced to run in, they will be directed by signals from the West pier-head.

TIDES.—It is high-water, full and change, at Whitby, at 3h. 45m.; springs rise 15 feet, neaps 11½ feet, and neaps range 8 feet.

The COAST from Whitby to Robin Hood bay, consists of high dark-coloured cliffs, occasionally tinged with red, and the low black point, Saltwick Nab, projects beyond the general line.

HIGH WHITBY or LING HILL LIGHTS.—Two octagonal white lighthouses stand near Ling hill, S.S.E. and N.N.W., 258 yards from each other. They exhibit *fixed white* lights of the first order, each placed at an elevation of 240 feet above high-water, and visible in clear weather at a distance of about 23 miles from N. by W. ¾ W. round westerly to S.S.E. ¾ E. The northern light changes to *red* over and inshore of Whitby Scar.

ROBIN HOOD BAY.—The North and South Cheeks of Robin Hood bay are bold headlands. Near to the brink of the latter, stands the mansion of Raven hall, while the village, chiefly inhabited by fishermen, is perched upon the face of the cliff in the north-west corner of the bay. The shore is divided between cliff and grassy bank, broken here and there by deep gullies or becks, and behind, the ground, which is highly cultivated, rises like an amphitheatre, and completes a fine picture of coast scenery.

Anchorage.—Ledges skirt the shores of the bay, and the clear space is very limited; but there is anchorage under the North Cheek with the wind as far to the northward as N.W., and under the South Cheek with winds to the westward of S.W., but neither position can be recommended, except for temporary purposes in summer.

A Life-Boat is stationed here; there are also rockets, and lines, for saving life.

The COAST.—From Robin Hood bay, high cliffs continue for 3½ miles to Haiburn wick, a slight indent at the mouth of a wooded vale, and then they decline in height considerably to Cloughton wick, another indent, rather more marked than the former one. From the cliff at Hundle point, the coast continues of the same character, but gradually decreases in height towards Scarborough, and is backed a few miles inland by the high ridges of Silpho, Suffield, and Seamer.

Rockets and lines are kept at Burniston in case of wreck.

The whole shore from Whitby to Scarborough is generally foul for one-quarter of a mile off, but at Robin Hood bay and Scalby Nab for double that distance; and when to the southward of Cloughton wick, Scarborough castle should be kept to the westward of S. by W., in order to avoid the foul ground from Scalby Nab.

SCARBOROUGH derives its name from the Saxon words "Scar" (rock) and "burgh" (fortification), and the castle of Scarborough, crowning its noble promontory, and commanding the town, is one of the most striking objects on the Yorkshire coast. The south part of the deep bay to the south-westward of the castle is bordered by steep grassy slopes with rocky ledges in front, but in the northern portion of the bay the foreshore is a smooth sand upwards of 300 yards broad at low-water; within it the land rises with a steep ascent, and upon this slope stands the town in the form of an amphitheatre, its chief object being the ancient church of St. Mary, standing on the summit of a ridge near the castle. Taking into view the elegant new town, the bold hill, Oliver mount (493 feet) overlooking it, its castle-crowned rock, the beauty of the surrounding scenery, and the table-land of the wolds bounding the prospect in the rear, Scar-

borough, as to situation and appearance, has no rival on the north-eastern coast. The town partly owes its prosperity to this circumstance, it also possesses great advantages as a watering-place, and it is frequented by numerous visitors. A chalybeate spring to the south of the town is connected to it by a handsome bridge, which, with the large Cliff hotel near it, are prominent objects from the bay. A branch of the North-Eastern railway connects Scarborough with York and Hull.

A promenade pier, on iron piles, extends 1,000 feet out from high-water mark about the middle of the north bay, having its head in a depth of 10 feet at low-water spring tides.

The shipping trade of Scarborough has declined of late years, from the competition of the railway, and other causes. It now consists of a limited import of coal, and of timber from the Baltic and America, and there is also a general exchange with other ports. The long-line, trawling, and herring fisheries are carried on to a considerable extent in a superior class of steam and sailing vessels, many of them of 75 tons. Water is led down to the harbour, and may be obtained at a reasonable charge. All other supplies are abundant. There is no patent slip here, but there is a dry dock equal to the repair of vessels of 250 tons. 172 vessels of 20,223 tons register belonged to the port on the 1st January 1881, and the arrivals in 1880, were 382 sail, besides fishing vessels. Population in 1881, 30,484.

Harbours.—The protection afforded by Scarborough rock in gales from the northward, must early have recommended its vicinity as a fit site for a harbour, and Scarborough has possessed one for several centuries. The present harbour is the result of many alterations and additions, and it is, as a whole, well designed for protection. It is formed by the East, Old or Vincent, and West piers, enclosing two independent harbours; the Outer, of $5\frac{1}{2}$ acres, and the Inner, of 9 acres. The bottom throughout is fine sand, and they both dry at low-water. The direction inwards and width of the several entrances are as follows:—Outer harbour, boom entrance, N.E. $\frac{3}{4}$ E., 33 feet; and bridge entrance, E. by S. $\frac{3}{4}$ S., 33 feet: Inner harbour, N.E. $\frac{1}{4}$ N., 100 feet. Vessels drawing 12 feet can enter and be berthed during springs, and those of 9 feet at neaps.

The harbours are much incommoded with silt, for the tidal stream which sweeps round the bay from south to north, carries the lighter particles from off the shore, and deposits them in the still water of the harbours. This eddy begins one hour before high-water upon the shore, and continues until two hours after low-water; in strong south-easterly winds, however, it sets constantly past the harbour's mouth, and increases the evil.*

* *See* Admiralty plan of Scarborough, with view, No. 1,624; scale, mile = 14·8 inches.

LIGHT.—A neat lighthouse and attached residence stand upon Vincent pier; the light is *fixed* and *white*, except in the direction of the entrance of the harbour, when it shows *red;* and is exhibited while there is 12 feet water at Vincent pier-head, 9 feet at the entrance to the Outer harbour, and 8½ feet at the entrance to the Inner harbour. It is 58 feet above high-water, and may be seen in clear weather at the distance of 13 miles. By day, a *white* skeleton ball is hoisted upon the lighthouse flagstaff to indicate the above depths.

A Life-boat, and the usual apparatus for saving life, are kept at Scarborough.

Ramsdale Scar.—The foot of the castle rock is clear at one cable off, and there is nothing to obstruct the approach to the harbour except Ramsdale Scar, a flat ledge of rock opposite the Spa bridge, the outer extremity being nearly 1¼ cable S. by W. ¼ W. from the lighthouse. Foul ground extends for 2 cables from the southern portion of the shore of the bay.

Directions.—Scarborough harbour is easy of access in moderate weather. Vessels can sail in with winds from N.E. by N., through east and south, to W.N.W., and at other times it is usual to shoot up as closely as practicable to the lighthouse pier, let go an anchor, and then warp in; prompt assistance under efficient direction is always at hand. The precautions should be adopted of entering the harbour between half-flood and first-quarter ebb, to have an anchor ready for letting go, and warps at hand, and it is sometimes necessary to make a board in closing the entrance, so as to give Ramsdale Scar a fair berth. A steam tug belonging to the Commissioners is in attendance at tide-time for the assistance of vessels; towage outward is at the rate of 1*s.* per keel, and inwards by agreement.

Vessels intending to enter the harbour for refuge should, if practicable, hang off shore until the tide be well up, then, if the wind be northerly, keep just outside the broken water at the castle foot, and run in before the sea. The back of the East pier is bold-to, and may be approached closely. In case of missing the entrance, the vessel may be beached on the sandy shore abreast, where life is always safe, and vessels generally sustain but little damage.

Scarborough bay, which is open to winds between N.N.E. and S.S.E., has a smooth bottom of fine sand over blue clay, in which the anchor holds well. The marks for the anchorage are, the keep of the castle bearing N. ¼ W., and the Spa house from West to W. by N. ¾ N., in 4 fathoms.

CAUTION.—Accidents have occurred in north-easterly gales to vessels approaching the harbour from the southward, in consequence of their

standing directly across the broken water in the bay, instead of getting well to windward until abreast the harbour, and then running in before the sea. When it is unsafe to enter the harbour, vessels are warned off by a lighted barrel on the East pier, or by the *white* ball not being hoisted upon the lighthouse flagstaff at tide-time.

TIDES.—It is high-water, full and change, at Scarborough, at 4h. 11m.; springs rise 15¾ feet, neaps 12½ feet, and neaps range 8½ feet.

The COAST from Scarborough to Filey is a continuous line of dark red cliff. Mill, or Cayton, bay, 2 miles to the southward of Scarborough, with a water-mill near its head, is sometimes used by small vessels as an anchorage in southerly winds. Red cliff, its south point, is high, and the cliffs then diminish in height to Car Naze. In working between Scarborough and Filey, the shore must be given a berth of at least half a mile.

Rockets and lines are kept at Cayton bay in case of wreck.

FILEY BRIG is a remarkable rocky ledge projecting nearly half a mile to the south-eastward in continuation from Car Naze, and forms the north-eastern defence to Filey bay. The remains of a pier, which has received the name of the Spittles, runs out abruptly from the inner face of the Brig; there is no record of the date of its construction, but it is generally supposed to have been a Roman work.

Buoy.—A *black* bell buoy, with staff and globe, lies in 6 fathoms, just to the southward of the outer extremity of the Brig; with Myer's house, over the summit of the first cliff to the southward of Hunmanby road, bearing S.W. ½ S.; and the top of the first cliff to the northward of Car Naze, open to the eastward of the highest part of the Brig, N.W. ¼ W.

Myer's house, upon the outline of the land near Speeton, kept well open to the southward of Hunmanby road, bearing S.W. ½ S., clears the outer point of the Brig.

FILEY BAY,* within and to the south-westward of the Brig, has throughout a bottom of clay covered by sand, but foul ground begins with Scarborough rock appearing outside Car Naze. Owing to the protection afforded by the Brig, there is fair riding in the bay with the wind as far out as N.N.E., but no vessel should remain in it with the wind to the eastward of that point. In southerly winds, there is good anchorage to the southward of the bay under Speeton cliff.

Filey bay has often been spoken of as a site for a harbour of refuge, it having, in the Brig, a breakwater half formed, but the bay is too shallow for any but small vessels.

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* *See* Admiralty plan of Filey bay, No. 1,720; scale, mile = 3·0 inches.

TIDES.—It is high-water, full and change, at Filey bay, at 4h. 20m.; springs rise 16 feet, neaps 12½ feet, and neaps range 9 feet.

Filey.—The town of Filey stands upon the summit of the bank at the head of the bay; it is a favourite bathing place, and, like Scarborough, is rapidly increasing in size and importance. A branch of the North-Eastern railway connects it with the latter place, and with York and Hull. The church, standing to the eastward of the town, shows prominently from the sea. Population in 1881, 2,337.

A Life-Boat is stationed at Filey, where are also rockets, lines, &c., for effecting communication with stranded vessels.

Water.—There is a spring of excellent water in the dell beneath Filey church, where boats may water with small casks and a hose.

The COAST, fronted by a sandy strand, is a steep grassy slope to Speeton, where it rises into high cliffs of chalk; Hunmanby, Cross, and Speeton, windmills being prominent objects on the background. The cliffs continue of the same character, and are nearly perpendicular, but a small break occurs at North Sea bay, which is used as a landing-place for cobles in southerly winds, and upwards of a hundred may be seen at times hauled up upon the slope in stormy weather. Many caves and detached masses have been formed by the constant chafing of the sea, but the base of the cliff is generally free from outlying dangers. Beyond North Sea bay, the coast, again increasing in height, terminates abruptly to the south-eastward in the noble promontory, Flamborough head.

CHAPTER IV.

FLAMBOROUGH HEAD TO THE HUMBER.

VARIATION, 18° 40′ to 18° 25′ West in 1882.

FLAMBOROUGH HEAD, the common point of arrival and departure for all vessels passing to the northward or southward along the eastern coast,* as well as for those sailing between the Humber and the Baltic, is, owing to its configuration and structure, and the buildings upon it, one of the most striking objects on the coast. It is a perpendicular cliff of white chalk from 120 to 130 feet high, and is supposed to have derived its name from a beacon tower, lighted to direct the mariner—a conjecture that appears to be well founded, as the head is represented with a flame upon it in all the ancient charts, and an octagonal tower 74 feet high, of undoubted antiquity, still stands upon its highest part, N.W. ¾ N. one-third of a mile from the present lighthouse.



Flamborough old tower.

Signal Station.—From a flagstaff erected upon this tower, communications are kept up with passing vessels by signals.†

LIGHT.—Between 1770 and 1806, 174 vessels were lost on or about the head, and proved the necessity for marking it more distinctly; accordingly, the present lighthouse was built over the south side of Silex bay, and one-quarter of a mile from the extremity of the head. The light, which was first exhibited on the 6th December 1806, *revolves*, showing a *flash every half-minute*, two *white* faces and one *red* alternately. When the distance is too great to distinguish the *red* light, a bright face will consequently appear at *intervals of a half, and one minute*, alternately;

* *See* Admiralty chart of east coast of England, sheet V., Trusthorpe to Flamborough head, with views, No. 1,190; scale, mile = 0·5 inch.

† At Flamborough head, and all the other signal stations, the *International (Commercial) Code* is the only code recognized, and vessels of any nation which make their names known by this code in passing the stations, will be promptly reported in the *Shipping and Mercantile Gazette*, and to the owners, if required.

the light is placed at an elevation of 214 feet above high-water, and is visible at the distance of 21 miles in clear weather.

Fog Signal.—During thick or foggy weather, a rocket is discharged *every ten minutes*, which, on reaching the height of about 600 feet, explodes with a loud report.

Life-Boats.—A life-boat is stationed on the north side, and another on the south side of Flamborough head, and rockets and lines are kept in case of wreck.

From Flamborough head, the North Cheek of Robin Hood bay bears N. by W. $\frac{3}{3}$ W., distant 25 miles; Scarborough castle, N.N.W. $\frac{1}{2}$ W., 15 miles; Filey brig, N.N.W. $\frac{1}{2}$ W., $8\frac{1}{2}$ miles; Kilnsea beacon, S. $\frac{1}{2}$ W., 30 miles; Dudgeon light-vessel, S. by E. $\frac{1}{4}$ E., 63 miles; and Cromer light-house, S. by E. $\frac{1}{4}$ E., 87 miles.

Flamborough Steel.—Silex bay, near the lighthouse, is but an indifferent landing-place, except at high-water in off-shore winds, and the stores for the lighthouse are usually conveyed by land from Bridlington. Flamborough ledge or steel, as it is commonly termed, projects south-easterly from the head for 2 cables, and is much in the way of vessels rounding the head; but it will be avoided by keeping the upper portion of the light-house well in sight above the land, or by giving the shore a berth of one-quarter of a mile.

From the head westward to as far as Sewerby, the coast continues to be limestone cliffs, fronted by a flat rocky foreshore, but a distance of 3 cables will clear it all. South Sea bay is a score, or break in the cliff, to the southward of the village of Flamborough, and is used by the fishermen as a landing-place in northerly winds. Sewerby hall, a handsome mansion surrounded by wood, stands $1\frac{1}{2}$ mile to the westward of it, and the cliff in front, changing from limestone to clay, gradually decreases in height towards Bridlington quay.

SMITHIC SHOAL, occupying a large portion of Bridlington bay, has a surface of sand, covering, it is said, a mass of limestone. Its north-east extremity bears S.S.W. $\frac{1}{2}$ W. distant $1\frac{1}{2}$ mile from Flamborough head lighthouse, and near this end is the highest part of the shoal, with only 10 feet water upon it. From this point, two shallow arms, with 2 and 3 fathoms over them, extend, the outer in a south-westerly direction for 3 miles, and the inner one W. by S. $\frac{1}{4}$ S. for $3\frac{3}{4}$ miles; the space between these projections, as well as that between the shoal and the shore, has a depth of only $3\frac{1}{2}$ or 4 fathoms, but there is 6 fathoms between the north side of the shoal and the main.

BUOYS.—North Smithic.—For the guidance of vessels rounding Flamborough head and entering Bridlington bay, a conical buoy, with

red and *white horizontal stripes*, has been placed at the north-east extremity of the Smithic, in 4½ fathoms at low-water; with Flamborough old tower, open to the westward of Gray's farm, bearing N. by E. ¾ E.; and the southernmost windmill at Bridlington quay, in line with a white house, W. by N. ¼ N.; Flamborough head lighthouse, N.N.E. ¼ E., distant 1½ mile; and Bridlington pier-head, W. ¾ N., 3½ miles.

South Smithic.—A *red* can buoy lies in 4 fathoms at low-water, at the south-west end of the outer arm of the shoal; with Flamborough new mill, touching the north end of a hedge row, bearing N. by E. ⅞ E.; Carnaby temple, in line with a clump of trees near the west end of a wood, N.W. ⅛ N.; and Bridlington church, N. by W. ⅞ W., distant 4 1/10 miles.

BRIDLINGTON BAY, a well-known roadstead, is to the westward of Flamborough head, and assuming its outer limit to be a line drawn from the head to Ulrome, it is 8 miles broad and 2 miles deep. To the westward of Sewerby the shore is clean, and anchorage may be taken up in any part of the bay between the north side of the Smithic and the shore, but the best position is with Sewerby hall bearing N. ¼ W., and Bridlington piers from W. ¼ S. to W. by N. ¾ N., in 3½ fathoms at low-water. Here there is a fair protection from north-easterly gales, but with the wind more easterly, no vessel should remain in the bay unless she be well found in ground-tackling, when it is very possible to weather the gale out; indeed, vessels frequently do so, owing to the protection afforded by the Smithic. It is, however, the more prudent course under such circumstances, to trip and run to the Humber.

A proposal to convert Bridlington bay into a harbour of refuge by constructing a breakwater upon the Smithic, has long been before the public, and considering the eligibility of the site, the enormous number of vessels constantly passing, and the difficulty which is often experienced in making the Humber in easterly gales, the establishment of such a work would be a national boon.

Directions.—The north-east Smithic buoy sufficiently marks the north channel into Bridlington bay, but should the buoy be out of position, then Flamborough old tower, kept open to the eastward of Gray's farm, bearing N. ¼ E.; or Flamborough head lighthouse, kept to the northward of N. by E. ¼ E., will clear the north-east end of the Smithic. Sewerby hall is now so covered in by wood as to be nearly useless as a sea-mark, but a building named the Temple, upon the outline of the hill to the westward of Bridlington, kept in line with the northernmost windmill at Bridlington quay, bearing W. by N. ⅛ N., will lead through in the fair-way between the Smithic and the shore. Should this mark be obscured, or not recognized, give the shore a berth of half a mile. When the lighthouse upon the head

has been brought to the eastward of N.E. ¼ N., the north-east end of the Smithic will have been passed, and a more westerly course must be shaped for the anchorage in the bay.

To pass to the southward of the Smithic, keep Auburn farm bearing N.W. by W. ¼ W. (this farm is whitewashed, and has a single chimney in the centre of a dark-coloured roof), and when Bridlington pier-heads bear N. by E. ¼ E., proceed with them so until Auburn bears W. by S. ¼ S.; the west tail of the Smithic will then have been cleared, and a more easterly course will lead to the anchorage.

BRIDLINGTON, or Burlington, with its venerable Priory church, is one mile back from the coast, but a suburb named Bridlington quay stands on the shore abreast, and has a small tide-harbour. Bridlington quay is composed of houses of a superior description, a terrace on its north-east side being the most noteworthy object about it, and is much resorted to for sea bathing. Both places have a number of windmills about them.

Signal Station.—Here is a signal-station with which passing vessels may communicate. *See* footnote, page 88.

A branch of the North-Eastern railway connects Bridlington with Hull, Filey, Scarborough, and York.

The trade of Bridlington is very limited, and confined to a small import of coal, and an exchange with London and other ports.

Life-Boats.—Two life-boats are kept in readiness in or near the harbour, with the usual life-saving apparatus.

Supplies.—A plentiful supply of good water may be obtained from the stream running through the harbour, or from a spring upon the side of the latter. All other supplies are abundant.

Population, 8,363 in 1881.

Harbour.—A harbour has existed at Bridlington quay from a very early period, and its maintenance being considered indispensable for the shelter of vessels embayed to the southward of Flamborough head, it derived the advantage of a passing toll for upwards of a century and a half. The harbour formerly contained 5½ acres, enclosed by north and south, or more properly speaking, east and south piers; the width of the entrance being 60 feet, and the course in N. ¾ E.; but as a heavy range was thrown in by on-shore gales, the harbour was enlarged in 1842–3 to 12 acres, by the construction of a new south pier. The east pier has also been extended 100 feet to the south-west to check the in-run of the sea during south-easterly winds, but the direction of the entrance having been thereby altered has rendered entry more difficult. The entrance is 90 feet wide. The bottom of the harbour throughout is a stiff clay, with a coating of sand and silt, and it dries at low-water springs, as well as the shore

for some distance outside the pier-heads. At high-water springs there is 16 feet depth between the pier-heads, and from 4 to 6 feet less over the harbour.

LIGHT.—A *fixed red* light is shown from the head of the east pier, at 24 feet above high-water, while there is a depth of 9 feet in the entrance of the harbour, and a *red* flag by day signifies the same fact. If the light be not shown at tide-time, it is to be understood that from a press of shipping, or other cause, the harbour is not available. By day, the like information is conveyed by a *white* flag with a *black* ball in the field, hoisted below the tidal flag.

CAUTION.—In north-easterly gales, with the wind inclined to some more easterly, it is prudent for vessels riding in Bridlington bay to go to the Humber, as before directed, or to enter the harbour during the last-quarter flood. The mistake is often made of waiting until after high-water, and vessels have consequently taken the ground and received much damage.

TIDES.—It is high-water, full and change, at Bridlington quay, at 4h. 39m.; springs rise 16 feet, neaps 12 feet, and neaps range 8 feet.

The COAST of Holderness from Bridlington to Kilnsea, near the mouth of the Humber, is free from danger, and is composed of cliffs of dark-coloured clay from 20 to 80 feet in height. No other portion of the eastern coast suffers so much from inroads of the sea; whole villages have been swept away; their churches and landmarks have gone with them; and those still standing near the shore await a similar tardy but certain fate. It has been computed from trustworthy observations, that the whole extent of coast from Bridlington to Spurn, retires from this cause 10 feet annually, representing a gross weight of four million tons of soil.

The back country is low, and there are not many features by which one portion of coast may be distinguished from another, but the following is a running description of the objects as they occur.

Cliff, 30 feet high, extends from Bridlington to Auburn; the height then is 15 or 20 feet to Ulrome coast-guard station, and 30 and 40 feet thence to Hornsea Gap, which is the first break that occurs. In the foregoing tract of coast several windmills and farm-houses are prominent, and the low square towers of the churches of Ulrome and Skipsea appear in the midst of trees, the latter with a dark-coloured fanless mill north-east of it; two mills near Atwick and Hornsea are also conspicuous.

A Rocket apparatus is placed at Ulrome.

HORNSEA village, situated low and surrounded by trees, is half a mile from the coast, and its fine large gothic church, which was deprived of

its spire by a hurricane, is a conspicuous object from the offing. Hornsea is much frequented as a bathing place, and it has also a chalybeate spring. An hotel and lodging houses for the accommodation of visitors, and coast-guard and railway stations, stand near the shore.* The sea, which is said to have been in former times 10 miles distant, is still making great ravages, and not many years ago, a part of the village, named Hornsea Beck, was swept away.

A Life-Boat, rockets, &c. are at Hornsea.

Cliff appears again a little to the southward of Hornsea coast-guard station, and averages 40 to 60 feet in height to the next break at Sand-le-mere.

MAPPLETON church stands in a commanding position close to the cliff, and having lately been surmounted by a spire, is a valuable sea-mark, as it serves to distinguish the portion of coast on which it stands. Bunker hill, whatever it may have been formerly, can no longer be considered a hill, as its summit is scarcely 20 feet above the general level of the cliff; a dark-coloured farm-house with out-buildings stands at the back of it, and there are several other farm-houses to the southward, near the cliff.

GRIMSTONE GARTH, though occupying one of the most elevated sites on the Holderness coast, is anything but a plain object from the sea. It is a castellated mansion much covered in by trees, and its highest tower is terminated by a stunted spire and flag-staff. The place is noted as having been the seat of the standard bearer of William the Conqueror. Afterwards Hilstone red brick tower, and small spire-church, and Tunstall tower-church, upon high ground, 2 miles to the southward, and then Owthorne mill, are all prominent objects.

SAND-LE-MERE.—At Sand-le-mere, the remains of a lake occasions a break in the cliff; there is a row of coast-guard houses upon the south side of it. The next gap occurs at Withernsea, and the intermediate cliff averages from 40 to 60 feet in height.

WITHERNSEA.—Owthorne and Withernsea churches, when entire, were known by seamen as the sister churches, from their standing so close together; the former fell in 1816, and now not a vestige is left. The old

* An iron pile pier extending out from Hornsea has been partly wrecked, and the fallen portion of the structure (about 210 feet), which is submerged at high tide, is marked by a *green* buoy. At night, two *white* lights, placed vertically, 6 feet apart, the lower light being about 20 feet above high-water of ordinary springs, are exhibited on a staff at the extremity of the remaining portion of the pier, which projects out to about low-water mark.

church of Withernsea was taken down several centuries ago and rebuilt in its present position, till lately it was in a ruinous state and unroofed, but it has again been restored; though it stands low, it is a plain object from the sea, as well as a large terrace upon the shore abreast. The spire of Patrington church, a short distance inland, is seen from every direction in the vicinity of the Humber.

Pier and Light.—There is a pier at Withernsea from the head of which a *fixed red* light is shown.

A Life-Boat is stationed at Withernsea; and rocket apparatus at Sand-le-mere, Holmpton, and Easington.

DIMLINGTON.—South of Withernsea, cliff again occurs, and at Out Newton, it rises into the bold elevation Dimlington height, 130 feet above high-water, which, being a very distinct object from the offing, serves to mark the neighbourhood of the mouth of the Humber.

From Dimlington, the cliffs decline towards Easington, the church of which is prominent.

KILNSEA.—Beyond Easington the shore is very low to North cliff, near which Kilnsea beacon is placed. This beacon, of timber painted *black*, is triangular, with a lozenge-shaped head, terminating in a ball, and is 67 feet high. Beyond the village of Kilnsea, and the cliff a short distance to the southward of it, the shore, skirted by low sand-hills, bends more westerly, and the Holderness coast finally ends at Spurn point, the northern boundary of the entrance to the river Humber.

RIVER HUMBER,* a common outlet for the numerous streams which collect the drainage of the greater part of Yorkshire and the mid-counties (comprising upwards of one-sixth of England), is formed by the junction of the Ouse and Trent, 17 miles above Hull, or 36 miles from the sea,—here the Humber is rather more than one mile wide, and after an irregular course, but mostly in an E.N.E. direction, nearly doubles its width as it reaches Hull; 2 miles farther down it turns abruptly, and runs S.S.E. for 10 miles; it then bends more easterly, and joins the sea as a stream 4 miles wide at high-water.

The Humber is confined for nearly the whole of its course between low embanked lands, from which the water has been progressively excluded by the process of silting or "warping," as it is here termed. Owing to the tortuous character of the river, and the amount of matter

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* *See* Admiralty chart, River Humber, with plans of Kingston-upon-Hull and Grimsby, and views of lighthouses and beacons, No. 109; scale, mile = 1·48 inch.

Directions from the entrance to Hull, are the result of a survey by Staff Captain John Parsons, H.M.S. *Porcupine*, 1875–77.

with which its waters are charged, the navigable tract is bounded by numerous shoals and extensive flats, and as the tide streams are rapid and irregular, those of springs and neaps setting in many instances in different directions, and as the low flat fore-shores offer but few objects as sea-marks, the navigation of the Humber is considered difficult. Every means to simplify it have, however, been adopted by the Trinity-house of Hull, the river being well buoyed, beaconed, and lighted, and an efficient body of pilots is maintained.

GRIMSBY stands upon the right bank of the Humber, 13 miles below Hull, and 6 miles above Spurn point. It is a very ancient borough, and its former prosperity is shown by its having furnished eleven ships and 170 mariners to Edward III. for the siege of Calais. Subsequently, its harbour became choked by sand; decay followed, and its trade became absorbed by Hull; but since 1801, when a dock was constructed at the mouth of Laceby beck, and connected with the navigation of the Humber by a straight outfall, the trade of the port has steadily increased.

The chief article of import is timber; there are also imports of raw cotton, corn, linseed, cattle, and sundries. Machinery is extensively exported, besides coal, manufactured bale goods, and general merchandise; the export of coal (principally to the continent) in 1880 amounted to 393,875 tons. There is a stated periodical trade by steamers with Cronstadt, Hamburg, Rotterdam, and Dieppe. The registered shipping of the port on the 1st January 1881 consisted of 659 vessels of 49,487 tons. The arrivals in 1880 were 3,722 vessels of 631,738 tons. Population, 29,682 in 1881.

Docks.*—The old dock is filled with fresh water by extensive inland drains, from which, unlike the water of the Humber, there is so little deposit, that it has only been necessary to clean the dock out twice since its formation. The depth in the lower part of the dock is 18 feet, and from thence to the town 14 feet. The lock is 150 feet long and 37 feet wide. The tide does not reach the gates until it has flowed 2 feet in the Humber. Before the dock was made, vessels of 5 or 6 feet draught only could reach the town at the highest tides, but now those of 16 and 17 feet are commonly admitted into the dock, which is extensively and chiefly frequented by timber vessels. The lock and outfall are kept clear by occasional sluicing. N.N.E. winds cause the highest tides at Grimsby, and those from N.N.W. the most sea, but the latter never to such an extent as to prevent the dock gates being opened. Vessels entering the Humber with loss of anchors and cables, often run ashore upon the soft mud in front, without sustaining any injury.

* Information from Dock Authorities, 1878.

But the principal feature of Grimsby is the Royal dock, excavated by the Manchester, Sheffield, and Lincolnshire railway company, between 1847 and 1852, out of the flat foreshore to the eastward of the old dock. The object of this important work was the establishment of a great commercial port near the mouth of the Humber. Locks connect the dock with a tidal basin formed by piers of open piling. The principal dimensions of this extensive work are as follows :—

	Dock and Timber Pond.	West Lock.	East Lock.	Tidal Basin.
Length, in feet -	2,330	300	200	1,000
Breadth, in feet -	500	70	45	880
Area, in acres -	27	..	..	14
Depth over sills, springs, in feet		26	26¾	..
„ „ neaps „ -		22	22¾	..

The entrance to the locks is kept open by dredging and occasional sluicing.

On the mass of solid masonry between the locks, a lofty square brick tower has been erected, for the purpose of giving the necessary height to a reservoir of water for working the lock-gates by hydraulic pressure; the whole of the cranes, &c. along the sides of the dock are also worked by the same simple machinery. The tower, which is a striking object from the offing abreast the Humber, is surmounted by an octagonal lantern, the top of which is 310 feet above the base of the building.

Lights.—A *red* light is shown all night at the head of each pier of the tidal basin.

Fog Signal.—A bell is rung at the north pier-head in fogs.

Along the sides of the dock are extensive warehouses, connected by branches with the main line of railway, to the great convenience of vessels loading or discharging cargoes, while there is every facility for coaling steam vessels.

A canal and lock connect the old dock and the Royal dock. The total length between the two docks is 871 feet, and the width of the canal is 95 feet; the length of the lock is 230 feet and its breadth 45 feet; the depth of water over the lower sill is 25 feet, and over the upper sill 21 feet.

For the accommodation of the fishing trade, which is very extensive, there is a fishery dock of 12 acres, to which an addition of 11 acres was made in 1877, making a total of 23 acres. On one side of the dock is a spacious landing-stage and fish market, 300 feet long, and provided with ample siding accommodation; there are also ice and curing houses. The number of smacks registered at Grimsby in 1878 was 503, with a tonnage of 29,771. In 1877, the quantity of fish sent by rail to all parts of the country was 44,376 tons.

Graving Docks.—There are two graving docks, one of which is capable of receiving ships of a large class; the other is for fishing craft. Their dimensions are as follows :—

	No. 1 Graving Dock.	No. 2 Graving Dock.
Length from gates to head, feet	400	400
„ on blocks - „	350	—
Width of entrance - „	70	30
Average depth on sill at high-water, feet	20	18½

Signal Station.—At Grimsby is a signal station with which passing vessels may communicate. *See* footnote page 88.

KINGSTON-UPON-HULL, situated at the junction of the river Hull with the Humber, 19 miles above Spurn point, and celebrated as a harbour for shipping from an early period, is now a place of the first mercantile importance; it has gradually risen to be the third port in the kingdom for its foreign trade.

The town stands upon a low level, and the southern face, which skirts the Humber, is about 2 miles long. The tower of the church of Holy Trinity, the towers and spires of other churches, numerous factory chimneys, and windmills on the east side of the town, and the dome of the gaol, are the chief objects which are seen in the approach from below.

The rivers Hull, Derwent, Ouse, and Trent, connect Hull with all the interior navigation of the west; while the Hull and Selby (now North-Eastern) railway, formed in 1840, joins it to the great lines traversing the inland districts, and hence with the principal manufacturing and commercial towns of the kingdom. Hull is the chief inlet for corn, linseed, cotton, rapeseed, timber, wool, flax, hemp, iron, madder, and rags; it also exports manufactured produce to the Low Countries, France, Germany, Denmark, and the whole of the north of Europe, and to these combined circumstances is owing its aspect of commercial bustle and prosperity.

Ship-building, both in wood and iron, is carried on. The whole trade of the port in 1880 consisted of the arrival of 5,938 vessels, with a total of 2,346,788 tons; of these 3,335 vessels of 1,648,000 tons were from foreign ports. On the 1st of January 1881 the registered shipping of the port was 656 sailing vessels of 46,855 tons, and 216 steamers of 142,559 tons. Numerous whalers formerly sailed from Hull, but at present this branch of industry is not prosecuted. Population, 154,250 in 1881.

Steam-vessels ply constantly to the pier at New Holland, on the opposite side of the Humber, in connection with the Manchester, Sheffield, and Lincolnshire railway; and there are river steam-vessels daily to Ferriby Sluice, Goole, Gainsborough, and Grimsby.

Vice-consuls for most foreign nations are resident.

Supplies.—All supplies are plentiful, and water may be filled by hose in several of the docks and in the ferry-boat basin.

Docks.*—The town was formerly encircled by fortifications, but their site is now occupied by a chain of docks, connected at their extremities with the Hull and Humber. The Victoria dock, added to the number in 1850, was excavated out of the ground eastward of the Hull—it also communicates with both rivers.

The dates of the construction of the various docks, their size, &c., are as follows :—

	Date.	Length. Feet.	Breadth. Feet.	Area. A.	R.	P.
Queen's dock	1778	1703	254	9	3	29
Basin		211	80	0	1	22
Lock		121	38		—	
Humber dock	1809	914	342	7	0	24
Basin		258	320	2	1	19
Lock		158½	41½		—	
Prince's dock	1829	645	407	6	0	5
Lock		120	35½		—	
Railway dock	1846	720	165	2	3	9
Lock			42		—	
Victoria dock	1850	2,015	378	20	0	4
Basin (outer harbour)		318	348	2	3	7
Half-tide basin		293	348	3	0	0
Drypool basin		345	145	1	0	8
„ outer basin		220	150	0	1	32
Old timber pond				13	3	4
New „				11	0	15
Albert or West dock,	1869	3,418	430	24	2	18
Basin			200	1	3	37
William Wright dock	1880	1,390	220	5	3	37

Depths over sills of locks.

	Springs. ft.	in.	Neaps. ft.	in.
Queen's dock	20	8	14	6
Humber dock	26	8	20	6
Prince's dock	20	6	14	6
Railway dock	26	8	20	6
Victoria dock	27	8	21	6
Albert dock	28	5	22	3
William Wright dock	28	5	22	3

The docks together embrace a water space of upwards of 88 acres, exclusive of timber ponds which are nearly 25 acres in area. Another dock is in progress which will have a water area of 10 acres, provision being made to extend it to 24 acres when found necessary. The total water space with projected extensions will be nearly 138 acres.

There are nine graving docks, one of which, recently constructed by the Dock Company is capable of accommodating vessels of the largest size ;

* Information from Dock Authorities, 1881.

and two of the other docks will admit ships of 1,300 tons. There are patent slips equal to vessels of 1,200 to 2,000 tons.*

GOOLE is situated upon the right bank of the Ouse at the confluence of Dutch river, 10 miles above the junction of Ouse and Trent, and 27 miles above Hull. Old Goole extends irregularly along the bank of Ouse, but the new town is compact and well-built. The church, built in 1846, is a cruciform structure of the perpendicular style, and, being surmounted by a lofty spire, is a striking object from every part of the neighbourhood.

Goole is connected by water and railway with all the chief manufacturing towns and neighbouring districts. Its principal imports are corn, oil, dyewoods, wool, and other raw products; and its exports, bale goods, machinery, stone, and coal, of which 374,493 tons were shipped in 1880. Steam communication with the continent was established as far back as the year 1833. Vessels of 17 to 18 feet draught frequent the port at springs, and those of 12 to 13 feet at neap tides.†

The registered shipping of the port in 1880 consisted of 341 vessels of 26,949 tons, and in the same year the arrivals were 2,111 vessels of 402,798 tons. Population, 10,339 in 1881.

There are such frequent changes in the channel of the Humber and Ouse between Hull and Goole, that a description of the pilotage would only tend to mislead. For this reason, and also on account of the rapidity of the tides, the services of a pilot should always be obtained. Seven or eight steam tugs constantly ply for towage between Hull and Goole.

Docks, &c.—Goole, constituted a port in 1827, is the property of the Undertakers of the Aire and Calder navigation; it owes its prosperity to being the outlet to that navigation through the Knottingley and Goole canal, which was commenced in 1820 and opened in 1826. In 1829, the Undertakers entered upon the construction of a series of docks, called the Ship, Barge, and Harbour docks; in 1840 the Steam-ship dock was formed, together with a large entrance lock, and in 1848 the Railway dock was added. The docks communicate with each other and with the Ouse by three locks; first, the Steam-ship lock, 264 feet long and 58 feet wide, with 22 feet over the sill at high-water springs; the Ship lock, 119 feet long by 33¼ feet wide, with 18¾ feet over the sill at high-water; and, lastly, the Barge lock, 72 feet long and 21¾ feet wide, with 21 feet over the sill. The aggregate area of the docks is 20 acres, and the river frontage, 1,090 feet in length, is faced with stone. There is also a graving dock, 225 feet long and 58 feet wide, with 11 feet over the sill; and a patent slip 180 feet

* Another slip, which is being constructed by Earle's Ship-building Company, will be capable of taking up a ship of 3,500 tons gross register, with a dead weight of 2,500 tons, in 90 minutes (October, 1881).

† From information supplied by Mr. W. H. Bartholomew, M. Inst. C.E., Engineer of the Aire and Calder navigation.

in length for repairs; and extensive ranges of warehouses for bonded and other merchandise. The various lock-gates, cranes, &c. are worked by hydraulic power; as well as a large hoist which lifts vessels carrying 40 tons of coal out of the water, and tips their contents into ships for export. The Lancashire and Yorkshire, and North-Eastern, railways have branch lines to the port.

SPURN POINT and LIGHTS.—Spurn point, the southern extremity of the coast of Holderness, consists of low sand-hills from 10 to 20 feet above high-water, but it is well distinguished by the lighthouses which stand upon it for marking the entrance to the Humber, and for leading in a fair-way from the south-eastward. The high lighthouse is a brick tower, 96 feet high, painted dark red; the light is *fixed* and *white*, except from the bearing N.W. by N., cutting two cables north-east of the Sandhaile buoy, round northerly, to S.E. by E. ¾ E., on which bearing it cuts one cable north of Grimsby pier, when it shows *red*; it is 93 feet above high-water, and is visible at the distance of 15 miles. The low lighthouse, which is now upon the inner side instead of the outer side of the point as formerly, bears N.W. distant 158 yards from the high lighthouse, and shows a *fixed white* light at 54 feet above high-water.

Caution.—In consequence of the encroachments of the sea having endangered the stability of the high lighthouse, mariners are warned that it may be found necessary to discontinue the exhibition of the light therefrom without an opportunity being afforded for giving due notice. In this event the point will be distinguished by the low light which shows all round, except where obscured by the high tower.

A Life-Boat is maintained at Spurn point by the Hull Trinity House; the boat is moored inside the point, is always afloat, and has an efficient crew of ten men residing at the station. A watch is kept by the crew night and day for vessels in distress.

A Postal telegraph office has been established at Spurn point.

SPURN LIGHT-VESSEL, with *Spurn* painted on her sides, lies in the fair-way of the entrance to the Humber, and is generally called the New-sand float, from having originally been placed to mark a shoal of that name, but which has since been washed away. She is moored in 9½ fathoms, and, at 36 feet above the water, exhibits a *white* light *revolving every minute*, which is visible at the distance of 10 miles.

Fog Signal.—A trumpet is sounded during foggy weather, giving *two blasts* in quick succession *every two minutes*.

From the vessel, Kilnsea beacon appears midway between Easington church and mill, bearing N. by W. ½ W.; Spurn low lighthouse, open its breadth to the northward of the high lighthouse wall, N.W. by W. ¼ W.; and Louth spire, open to the westward of Grainthorpe church, S.W. by W.;

Flamborough head lighthouse is North, 35 miles; Kilnsea beacon, N. by W. ½ W., 5½ miles; Banks No. 1 buoy, N. by E. ⅔ E., $1\frac{2}{10}$ mile; Banks No. 3 buoy, W.N.W., 3 miles; Spurn high lighthouse, N.W. by W., $4\frac{1}{10}$ miles; Bull Sand light-vessel, W. by N. ½ N., $4\frac{9}{10}$ miles; Chequer shoal buoy, W. ¼ N., $1\frac{8}{10}$ mile; Sandhaile buoy, S.W. ¼ S., $1\frac{9}{10}$ mile; Donna Nook beacon, S.W., 6 miles; and the Dudgeon light-vessel, S.E. by S., 32 miles.*

Wreck.—One mile S.W. by W. from Spurn light-vessel lies the wreck of the steam-ship *Dunsany*, recently blown up, and over which there is a depth of 26 feet.

STONE BANKS, or Binks, are connected with, and front Spurn point to the south-eastward. They are composed of shingle and sand, and named Outer, Middle, and Inner; the Middle and Inner are partially uncovered at low-water springs. A narrow channel is at times formed between the Inner bank and Spurn point, but it is only fit for the use of boats.

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* Light-vessels belonging to the Trinity House, London, are coloured *red*.

The following regulations have been established respecting the several light-vessels on the coasts of England; viz.:—

A *white* light is exhibited from the forestay of each light-vessel, at a height of six feet above the rail, for the purpose of showing in which direction the vessel is riding, when at her station.

When a light-vessel is driven from her proper position to one where she is of no use as a guide to shipping, the following signals will be made, viz.:—

The usual lights will not be exhibited, but a fixed *red* light will be exhibited at each end of the vessel, and a *red* flare shown every quarter of an hour. By day, the balls or other distinguishing mast-head marks will be struck.

If from any cause the light-vessel be unable to exhibit her usual lights whilst at her station, the riding light only will be shown.

The mouths of fog horns, in light-vessels, are pointed to windward; also those on the land with the wind from seaward.

When, from any of the light-ships, a vessel is seen standing into danger, a gun will be fired and repeated until observed by the vessel; also, the two signal flags J. D. of the Commercial Code "*You are standing into danger*" will be hoisted and kept flying until answered.

Whenever a light-vessel or other craft is anchored to mark the position of a wreck, the top-sides will be coloured green, and she will be further distinguished, by day, by three balls placed on a yard 20 feet above the sea, *two balls (vertically) on the side on which navigating vessels may safely pass*, and one on the other side; and by night, by three *fixed white* lights similarly arranged and with the same meaning. These marking vessels, when so employed and fitted, will not show the ordinary riding light, *see* page 2.

NOTE.—The firing special rockets (of little sound but of great brilliancy) immediately after a gun from a light-vessel will denote the need of assistance from the shore; rock lighthouses are also supplied with the special call rockets, for use when assistance is required from the shore.

Buoys.*—The east and south sides of the Stone banks are marked by the following buoys:—

No. 1, Outer bank, the easternmost and outermost, is a *black* nine-pin shaped buoy with staff and triangle, in 38 feet; with Easington church, well open to the northward of Kilnsea beacon, bearing N.N.W. $\frac{1}{4}$ W.; and the windmills at Cleethorpe, open of Spurn point, W. by N.; Spurn high lighthouse, W. by N. $\frac{1}{2}$ N.; and Spurn light-vessel, S. by W. $\frac{2}{3}$ W., distant $1\frac{2}{10}$ mile.

No. 2, Middle bank, W. $\frac{1}{2}$ N. $1\frac{6}{10}$ mile from Bank No. 1, is a *black* nine-pin with staff and globe, in 27 feet; with Dimlington height, just open to the eastward of Kilnsea beacon, bearing N. $\frac{1}{2}$ W.; and Grimsby hydraulic tower, in line with Spurn high lighthouse, W.N.W.

No. 3, Inner bank, West, $1\frac{6}{10}$ mile from Bank No. 2, is a *black* nine-pin, in 30 feet; with Dimlington cliff, in line with Easington windmill, bearing N. $\frac{3}{4}$ E.; and Grimsby hydraulic tower, open of Spurn point, N.W. by W. $\frac{1}{2}$ W.; Spurn high lighthouse, N.W. $\frac{1}{2}$ N.; and Bull light-vessel, W. $\frac{3}{4}$ N., distant $1\frac{9}{10}$ mile.

These buoys are all close to the Banks.

CHEQUER SHOAL, a patch of stony ground, half a mile in extent, with 18 feet upon it, is one mile to the southward of the Banks, and W. $\frac{1}{2}$ N., $1\frac{3}{4}$ mile from Spurn light-vessel.

Buoy.—A nine-pin buoy, No. 1, with *black* and *white horizontal stripes,* lies on its eastern side in 22 feet; with Easington windmill, midway between Easington church and Dimlington cliff, bearing N. $\frac{1}{4}$ W.; Spurn low lighthouse, open to the westward of the high lighthouse, N.W. $\frac{1}{2}$ N.; and Bull light-vessel, N.W. by W. $\frac{1}{2}$ W., distant $3\frac{2}{10}$ miles.

SANDHAILE is an extensive sandy flat or shelf projecting from the Lincolnshire coast, and forms the southern boundary of the navigation at the entrance to the Humber.

Buoy.—The north-east extremity is marked by a nine-pin buoy, No. 1, or Sandhaile, *striped vertically black* and *white,* with staff and cage ball, lying in 24 feet; with the spire of South Somercoates church, open to the southward of North Somercoates church, bearing S.W.; spire of Patrington church open north-east of Spurn high lighthouse, N.N.W.; Spurn light-vessel, N.E. $\frac{1}{2}$ N.; and Bull light-vessel, N.W. $\frac{1}{2}$ W., distant $4\frac{1}{2}$ miles.

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* The buoys of the Humber, numbered throughout, are *black* to the northward, and with *black* and *white vertical stripes* to the southward; those on Chequer shoal and Middle grounds have *black* and *white horizontal stripes.*

DONNA NOOK, the low point of Lincolnshire bounding the outlet of the Humber to the southward, is marked by a beacon 60 feet in height, formed of wood, painted red, and of a triangular shape, surmounted by a smaller triangular head.

The Life-Boat stationed at this point has been very successful in saving life. A rocket apparatus is also kept here.

BULL SAND, a short distance within Spurn point, and nearly in mid-channel of the entrance, is $2\frac{1}{2}$ miles long in a N.W. and S.E. direction, by one mile broad. On it are two large patches, with 15 and 16 feet water over them, the rest of the main shoal having 3 to 5 fathoms.

A LIGHT-VESSEL, showing, at 21 feet above the water, a *fixed white* light, visible from a distance of 8 miles, is moored near the south-east side of the shoal in 5 fathoms. The vessel is painted red, with the name *Bull* on her sides, and she carries a globe at the mast-head. A small *white* light is exhibited from the stern, at 12 feet above the deck, for the purpose of showing in which direction the vessel is riding.

Fog Signal.—A bell is sounded during thick or foggy weather.

From the light-vessel, Grimsby church, open a little to the northward of the railway station at Cleethorpe, bears W. by N. $\frac{7}{8}$ N.; and the life-boatmen's houses at Spurn in line, N.E. by E. $\frac{1}{2}$ E.; Clee-ness buoy, N.W., distant $2\frac{1}{2}$ miles; Spurn high lighthouse, N.E. by E. $\frac{3}{4}$ E., $1\frac{4}{10}$ mile; Spurn light-vessel, E. by S. $\frac{1}{2}$ S., $4\frac{9}{10}$ miles; and Sandhaile buoy, S.E. $\frac{1}{2}$ E., $4\frac{1}{2}$ miles.*

Buoy.—A nine-pin buoy, No. 2, Bull, *striped vertically black* and

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* The following instructions have been issued by the Trinity House at Hull to the masters and mates of the Bull sand and Middle sand light-vessels:—

In the event of the light-vessel being driven from her station, the master or mate, whichever be in charge, is carefully to consider whether she has driven to such a distance, or in such a direction, as to make it dangerous to shipping to continue to show her lights; and if the distance or direction be not such as to endanger the safety of vessels running on their course, the lights and ball are to be continued in the usual manner.

But, should the light-vessel have driven so as to be of no use as a guide to shipping, the usual lights and ball are, in that case, to be discontinued, and two red lights substituted, one at the end of the davit, forward, the other on a stanchion, beside the ensign-staff; and a red flare light is to be shown every quarter of an hour during the night.

When vessels are observed from a light-vessel to be in distress, or to require assistance:—

If in the daytime, two guns are to be fired on board such light-vessel, each at an interval of five minutes, and repeated every half hour until assistance be observed approaching.

If in the night-time, two guns are to be fired on board such light-vessel at similar intervals, each followed by a white rocket thrown in the direction of the vessel in distress, and these signals are to be continued until the required assistance has been rendered.

white, lies in 20 feet, N.W ½ W. $\frac{5}{10}$ of a mile from the light-vessel, and close to the eastern side of the eastern shallow patch of Bull sand; with Grimsby church, open to the northward of the railway station at Cleethorpe, bearing W. by N. ½ N.; and a low flat wood on the outline, open its own breadth to the southward of Tetney grove, S.W. ½ S.

TRINITY and SUNK SANDS.—Both shores of the Humber within the entrance are skirted by extensive flats, which in some places dry out a considerable distance at low-water. Thus, nearly the whole of the extensive bight on the north shore between Spurn point and Sunk island is occupied by Trinity and Sunk sands, which together are about 6 miles long and 2 miles broad; these sands are now continuous, the old Patrington channel being extinguished.

NORTH CHANNEL.—Close within Spurn point, between Trinity sand and Kilnsea clays, is a small inlet one mile deep and 2 cables wide. In this inlet small vessels are placed with security.

Buoys.—The outer end of Trinity sand is marked by the following buoys:—

No. 4, Lower Trinity, *black* nine-pin buoy, lies in 27 feet, with Spurn high lighthouse, three times its breadth to the southward of the low lighthouse, bearing S.E. ¾ E.; and Dimlington height, over the storehouse upon Easington shore, N.N.E., northerly.

No. 5, Upper Trinity, *black* nine-pin, lies in 16 feet, with Spurn high lighthouse, open its breadth to the eastward of the low lighthouse, bearing S.E. ½ S.; and Easington windmill, midway between Winsett's farm and Easington church, N.E. ⅓ E.

A Life-Boat is stationed at Cleethorpe.

CLEE-NESS SAND is an extensive flat of loose stones and shingle, which projects from the Lincolnshire shore for 2¼ miles abreast the village of Cleethorpe.

Buoy.—No. 3, Clee-ness.—This turning point in the navigation is marked by a nine-pin buoy, *striped vertically black* and *white*, with a vane, lying in 3 fathoms; with Humberston church, under the western of two distinct clumps of trees on the outline, bearing S.W. ¼ W.; and Grimsby church, just to the westward of the eastern windmill in Grimsby marsh, W. ½ N.; Burcom, No. 4 buoy, N.W. by W., distant $1\frac{9}{10}$ mile; and Bull light-vessel, S.E., 2⅓ miles. There is a depth of only 8 feet a short distance within the buoy.

MIDDLE SAND begins 2 miles above Spurn point, and continues on for 4 miles nearly in mid-stream to abreast of Grimsby. Hawk road is between its south-east end and Spurn point, and Sunk road between its north-west end and Sunk spit. Both the height and shape of this shoal are

subject to constant change; its shallow part is now one mile long and a cable wide, with 17 feet least water. Killingholme lights in line, N.W. $\frac{3}{8}$ W., leads south of the Middle.

MIDDLE LIGHT-VESSEL.—A light-vessel, painted red, and carrying a globe at her mast-head, with the name *Middle* on her sides, is moored in 4 fathoms on the north-west end of the shoal, and shows, at 20 feet above the water, a *fixed red* light, visible from the distance of 7 miles. A small *white* light is exhibited from the stern, at 12 feet above the deck, for the purpose of showing in which direction the vessel is riding. From the light-vessel, Grimsby hydraulic tower bears W. by S. $\frac{1}{4}$ S., and Killingholme high lighthouse appears open a little to the north-east of the south-east low lighthouse.

Buoys.—Middle, No. 3, nine-pin, *striped horizontally black* and *white*, in 18 feet, on the north-east side of the sand; with Spurn high lighthouse, its breadth open to the southward of the low lighthouse, S.E. $\frac{3}{8}$ E.; and Grimsby church, open to the westward of a factory chimney at Grimsby, W. by S.; Burcom, No. 4 buoy, W. $\frac{1}{4}$ S., $1\frac{1}{2}$ mile; and Sunk Spit buoy, N.W. $\frac{1}{4}$ N., $4\frac{1}{2}$ miles.

Lower Middle, No. 2, a *black* and *white horizontally striped* buoy, lies in 3 fathoms, on the south-west edge of the sand; with Spurn high lighthouse, open to southward of the low lighthouse, bearing S.E. $\frac{1}{2}$ E.; Killingholme high lighthouse, open to the northward of the south-east low lighthouse, N.W. $\frac{1}{2}$ W.; Middle light-vessel, N.W. by W.; Bull light-vessel, S.S.E., distant $2\frac{1}{2}$ miles.

BURCOM is a narrow sand skirting the outer edge of the broad muddy flat in front of Grimsby, from abreast the upper part of the Middle to within 2 miles of Stallingborough ferry-house, a distance of over 3 miles. It is composed of firm sand which never shifts; a considerable portion of it dries at low-water.

Buoys.*—No. 4, Burcom, nine-pin buoy, *striped vertically black* and *white*, lies in 24 feet on the south-east end of Burcom sand; with Grimsby church, just open to the southward of a factory chimney at Grimsby, bearing W. by S. $\frac{1}{2}$ S.; and Humberston church, over the end of Cleethorpe pier, S. by W. $\frac{3}{4}$ W.

No. 5, Middle Burcom, a buoy *striped vertically black* and *white*, lies in 21 feet abreast the dry portion of the Burcom, and N.W. $\frac{1}{2}$ W. $2\frac{1}{4}$ miles from No. 4 buoy; with Cleethorpe inner mill No. 2, open of the piers of Grimsby dock, bearing S. by E.; and Killingholme high lighthouse, open to the westward of the south-east low lighthouse, N.W.

* To facilitate the navigation of Grimsby inner road, a small *black* buoy with a staff has been placed in 10 feet on the inner part of the south-east end of the Burcom; with Grimsby hydraulic tower bearing W. by S. $\frac{1}{2}$ S.; and Killingholme lighthouses, open southward, N.W. $\frac{1}{4}$ N. 3rd February, 1882.

No. 6, Upper Burcom.—A nine-pin buoy, *striped vertically black* and *white*, lies outside and above the upper part of the Burcom, in 15 feet, and N.W. ½ N. $1\frac{7}{16}$ mile from No. 5 buoy; with Immingham church, open to the westward of Stallingborough ferry-house, bearing W. by N. ¾ N.; and Killingholme high lighthouse, open to the westward of the south-east low lighthouse, N.W.

SUNK SPIT is a projection from the south-west part of Sunk island; its extremity is not marked, but a *black* nine-pin buoy, with staff and ball, No. 6, lies in 18 feet, 1¼ mile above it; with Patrington spire, in line with the north end of Sunk trees, bearing N.E. by E. ½ E.; Paull church, open of the jetty at Stone creek, N.N.W.; and Holme buoy, No. 8, N.W. by W., distant 2¾ miles.

STALLINGBOROUGH LIGHT.—A *fixed white* light is shown from one of the windows of Stallingborough ferry-house. Running up, with Killingholme lights in line, it appears when abreast Burcom sand, is brightest on a W.S.W. bearing, (showing the anchorage for large ships below the Holme Ridge No. 7 black buoy) and becomes fainter and finally disappears when abreast the Holme buoy.

Measured Mile.—Two pairs of spar beacons, painted red, have been placed on the right bank of the Humber, at Stallingborough, to mark a geographical mile on the line of Killingholme high lighthouse and south-east low lighthouse, for the use of steam-vessels testing their speed.

The northern beacons, which are distinguished by open square heads, are fixed at Stallingborough haven; the southern pair, which are surmounted by globes, are near Clump farm to the S.S.E. of Stallingborough ferry-house.

A vessel while being tested is required to carry two *black* balls at the fore, and ships in the vicinity should be careful to keep clear of her, and to avoid breaking her direct course.

NEWSHAM BOOTH LIGHTS.—Two lighthouses stand at Newsham Booth on the Lincolnshire shore about 1½ mile below Killingholme lighthouses, they show *fixed white* lights, the high light at an elevation of 41 feet, and the low light at 31½ feet above high-water. The higher tower is painted dark red, the lower tower is white, and is 90 yards northward of the former. In navigating the Humber between South Killingholme haven and Paull, the lights at Newsham Booth serve as leading lights to the northward until the lights at Thorngumbald clough appear in line; and to the southward until the high and lower Killingholme lights are in line. A *red* light is also exhibited from the high lighthouse at Newsham Booth to indicate the position of Holme Buoy, No. 8, black; the light is only visible when abreast that buoy.

HOLME RIDGE, upon which there are from 7 to 14 feet at low-

water, is the southern end of the extensive mass of sands which front the eastern shore between Stone creek and the village of Paull. The general direction of the ridge is parallel to the western shore, and it joins the next sand above it, Foul Holme. Some masses of soft clay, named the Clay Huts, with 13 feet on them, project into the channel from the upper end of Holme ridge. The south-west side of the ridge is marked by two buoys.

Holme ridge, No. 7, *black* nine-pin, near its south-east extremity, in 13 feet; with Ottringham spire, a little west of the entrance to Stone Creek, bearing N.E. $\frac{1}{2}$ E.; and Killingholme high lighthouse, open a little to the northward of the south-east lower lighthouse, N.W. $\frac{3}{4}$ W.

Holme, No. 8, *black* nine-pin, near its south-west elbow, and N.W. by W., $\frac{8}{10}$ mile from the Holme ridge buoy, lies in 18 feet; with the Earl of Yarborough's mausoleum, open to the westward of the shepherd's house near the battery, bearing S.W. by W. $\frac{3}{4}$ W.; and Killingholme high lighthouse, just open to the northward of the south-east lower lighthouse, N.W. $\frac{3}{4}$ W.

FOUL HOLME and PAULL SANDS are the lower and upper portions of one continuous mass; beginning abreast Stone creek, they extend northward for 2 miles, and then trend more northerly, joining the eastern shore a little below Paull village. A blind channel with depths of 2 and 3 fathoms in it, separates the body of the sands from the northern shore.

Buoys.—The west elbow of Foul Holme is marked by—

Holme Hook, No. 9, *black* nine-pin, in 18 feet, N. by W. $\frac{1}{4}$ W., $1\frac{1}{2}$ mile from Holme buoy; with Paull former lighthouse, on with Paull cliff, bearing North; and Killingholme church, in line with the south end of a cluster of trees to the westward of Killingholme lighthouses, W. $\frac{1}{2}$ S.

North Holme, No. 10, *black* nine-pin buoy, lies in 17 feet; with St. Stephen's church spire at Hull, just open of Skitter-ness; and Paull village wholly open of Paull cliff, bearing N. $\frac{1}{2}$ E.

KILLINGHOLME LIGHTS.—Killingholme lighthouses consist of a high lighthouse and two low lighthouses, the latter termed respectively South-east and North, or upper and lower, all standing close within the embankment on the west shore abreast Foul Holme sand. The high lighthouse and the north tower are painted dark red, the south-east tower is white, and they show *fixed white* lights. The high light is 68 feet above high-water; the south-east low light is 35 feet above high-water, and S.E. $\frac{3}{8}$ E. 207 yards from the high light; when in line, they lead up the main channel of the Humber between the Middle, Sunk spit, and Holme

ridge to the north-east, and Bull sand, Clee-ness sand, Burcom, and Stallingborough flat to the south-westward. The north low light is 37 feet above high-water, and N. $\frac{3}{4}$ E., 264 yards from the high light; when in line, they lead between Foul Holme and Paull sands to the eastward, and Skitter sand-end to the westward.

HALTON MIDDLE, half a mile long, and with 15 feet over it, lies in mid-channel one mile above Killingholme lighthouses; Stallingborough ferry-house in line with Grimsby church leads very close to its steep south-western edge; it will be avoided on the Foul Holme side by keeping the two lighthouses at Newsham Booth in line. The tides when strong ripple on this shoal.

SKITTER SAND, forming a turning point in the navigation, begins at Killingholme haven, and continuing round Skitter Ness confines the channel to the Yorkshire side. This sand, which is the most dangerous obstruction in the Humber, sends out a tail towards the Clough lighthouses, leaving a channel but 3 cables wide past the village of Paull. A considerable part of this sand dries 2 to 4 feet at low-water.

Buoys.—The Skitter is marked by the following buoys near its outer edge :—

Skitter Sand-End, No. 7, a nine-pin buoy *striped vertically black* and *white*, in 18 feet, N. $\frac{3}{4}$ W. $2\frac{3}{10}$ miles from No. 10 black buoy, and below the lowest dry point of the Skitter; lies with Hedon church tower, a little open to the northward of Paull former lighthouse, bearing N.E. by E. $\frac{1}{2}$ E.; and Killingholme high lighthouse, just open to the west of the north low lighthouse, S. $\frac{1}{2}$ W.

Elbow, No. 8, a nine-pin buoy, *striped vertically black* and *white*, in 15 feet, N. $\frac{1}{2}$ W. half a mile from No. 7 buoy; with Hedon church tower, on with the entrance to Hedon haven, bearing E. by N. $\frac{1}{4}$ N.; dome of the new gaol, N.N.W. $\frac{1}{4}$ W.; and Thorngumbald clough lights open of each other, S.S.E. $\frac{3}{4}$ E.

Anson, No. 9, a nine-pin buoy, *striped vertically black* and *white*, in 15 feet, N.W. by N. one mile from No. 8 buoy; lies with St. James church tower at Hull, on with the south pier of Albert dock, bearing N.W. by W. $\frac{1}{2}$ W.; and Sutton church, open to the eastward of the eastern-most windmill on Holderness road, N. $\frac{1}{4}$ E.

HEBBLES.—Foul ground, in places half a mile from the shore, extends all the way from Paull cliff to near the river Hull, confining the navigable channel round the edges of the Skitter and Hull Middle to less than a quarter of a mile in width. Preston Cranch and several other patches are upon this shelf; but the Hebbles, the principal obstruction,

1¼ mile below the river Hull, is a collection of loose stones showing at low-water springs, with 6 fathoms close to it.

Buoys.—Lower Hebbles, No. 11, *black* nine-pin buoy, lies just outside it in 18 feet; with Paull church and former lighthouse in line, bearing S.E. by S.; and Marfleet church, in line with Trinity house farm, N.E., northerly.

Upper Hebbles, No. 12, *black* nine-pin, lies in 18 feet; with the large chimney of Kingston cotton mill, in line with St. Mark church, bearing N.N.W. ⅔ W.; and the tower of Holy Trinity church, over the west side of Victoria dock basin, N.W. by W. ⅔ W.

There is a small *black* cone buoy, No. 13, lying in 12 feet, half a mile above No. 12 buoy.

THORNGUMBALD CLOUGH and SALT END LIGHTS.—Two lighthouses stand at Thorngumbald clough, about half a mile to the southward of Paull former lighthouse; they bear from each other S.S.E. ½ E. and N.N.W. ½ W., and show *fixed white* lights, at 50 and 30 feet above high-water. The other two lighthouses are at Salt End, near Hedon haven; they bear S.E. by E. ¼ E. and N.W. by W. ¼ W. from each other, and also exhibit *fixed white* lights, at 50 and 30 feet above high-water. The high lighthouse at each place is supported on iron pillars, is painted red, and is 50 feet high; the low lighthouses are circular towers, painted yellow, and 30 feet in height, and can be moved to suit the changes in the channel. These lights are to assist in the navigation round the Skitter, and up to Hull road, from the point at which Newsham Booth, or Killingholme, lights cease to be used for that purpose. The high white light at Salt End becomes visible to a vessel ascending the river when about half a mile above No. 8 (black) buoy near Holme ridge.

HULL MIDDLE, forms the southern boundary of Hull road, and is the last of the dangers in the lower portion of the Humber needing description. Being composed of light moveable sand, the shape and height of this shoal vary; in 1877 it dried at low-water springs to the extent of 1½ mile in an east and west direction. Since then (September 1879 and August 1881) the sand has been found to have grown up and extended to the northward and eastward, and in the vicinity of buoy No. 10, black and white vertical stripes, there is now only 4 feet at low-water. The navigable channel at this part of the river is at all times narrow; and in consequence of this extension more than usual care is requisite.

Buoys.—Hull Middle is marked on its north side by two buoys:—**No. 10,** a nine-pin buoy *striped vertically black* and *white*, in 4 feet, N.W. ½ W., three-quarters of a mile from No. 9, Skitter sand; with the spire of St. Stephen's church, open to the northward of the tower of Holy

Trinity church, bearing N.W. $\frac{3}{4}$ W.; and the tower of the waterworks at Stone ferry, in line with the sailless mill on Holderness road, N. by W., westerly; Hull Middle, or No. 11 buoy, W.N.W., distant half a mile.

No. 11, a nine-pin *striped vertically black* and *white*, lies in 15 feet; with Drypool church, on with the dock-master's office at the Humber entrance of Victoria dock, bearing N.N.W. $\frac{1}{2}$ W.; and the low light at Salt End, open to the northward of the high light, S.E. by E. $\frac{1}{2}$ E.

ANCHORAGES in the HUMBER.—On account of the large column of rise and fall in the river, the state of the tide should always be borne in mind when taking up an anchorage.

Hawk Road between the Middle, Trinity sand, and Spurn point, is 2 miles long and half a mile wide. It affords shelter from winds between North and S.E.; it is frequented by loaded vessels with southerly winds, and by light colliers in northerly winds, but it should only be used as a temporary roadstead, for the sets of the tide-streams are strong and untrue, and it is difficult to keep an anchor clear. A vessel from the same cause has been known to snap her chain in a calm; it has also the additional disadvantage that it cannot be quitted by a sailing vessel with a south-west wind and flood tide. The bottom consists of sand and shingle with some patches of clay. In the lower part, the anchorage mark is, Spurn lighthouses in line, bearing S.E.; and in the upper part, the high light-house open a little to the northward of the low lighthouse, in a depth of 7 to 12 fathoms.

Grimsby Road has good anchorage under ordinary circumstances of wind and weather. Large ships generally anchor in the stream of No. 4 Burcom buoy, in from 4 to 7 fathoms, so as to avoid the strength of the tide. Small vessels anchor in the inner road in from 7 to 10 feet. The bottom is clay coated with mud.

Caution.—The seaman is cautioned not to anchor with Killingholme lights in line, as accidents have resulted from vessels obstructing the main navigable track.

During the prevalence of strong easterly winds, as many as from seven hundred to eight hundred sail have been anchored in the roadsteads at the lower part of the Humber.

Sunk Road, between the upper part of the Middle and Sunk spit, has good anchorage in all weather, especially in northerly and easterly gales. There is plenty of room for a large fleet in depths of 6 to 9 fathoms, mud and clay. The tide streams set fairly through it; a good berth is with Patrington spire, in line with the old south-east embankment of Sunk island, bearing N.E. $\frac{3}{4}$ N.; and Killingholme high lighthouse, open a little to the northward of the south-east lower lighthouse, N.W. $\frac{3}{4}$ W.

Whitebooth Road, between Halton Middle and the Lincolnshire shore, is used by vessels which are unable to reach Hull with the last of the flood. The proper anchorage is in 6 or 7 fathoms, with Patrington spire, in line with Salthaugh trees, bearing E. by S. $\frac{1}{4}$ S.; and Grimsby church, just open to the southward of Stallingborough ferry-house, S. by E. $\frac{3}{4}$ E.

Paull Road is a little below Paull cliff, and abreast Paull sluice. As the ground is hard, and the tide streams rapid, this anchorage should be avoided, except on an emergency. A vessel driven out of it by the flood was wrecked upon Skitter sand.

Hull Road is to the northward of Hull Middle. In using it, the only precaution necessary is not to anchor too near to the Hebbles, though the closer in the easier the tide. The bottom is mud and sand, and the depth 5 to 7 fathoms. The upper part of the roadstead is too shallow for large vessels.

Pilots.— There are seven pilot vessels belonging to Hull, worked by seventy-seven pilots and twenty-one apprentices and boys; the vessels are numbered from 1 to 7; one of the vessels cruises from Spurn light-vessel northward to Dimlington; another from Spurn light-vessel southward to Donna Nook; another in the lower part of the Humber; and a fourth is stationed in Grimsby dock; the remaining vessels are at Hull. They carry the usual pilot flag by day, and a *white* light at the mast-head by night.

Steam Tugs.—About twenty steam tugs ply on the Humber for the purpose of towing vessels in the river, and into and out of the docks and harbour.

DIRECTIONS.—On ordinary occasions, vessels from the northward bound to the Humber should endeavour to close the land abreast Dimlington height, or Kilnsea, for both are well-marked portions of coast, and with shores free from danger. Having sighted them, and shaped a course for the entrance, keep Dimlington height to the westward of N.N.W. $\frac{1}{2}$ W., or Kilnsea beacon to the westward of N.W. $\frac{1}{2}$ N., so as to avoid the Outer Banks, and approach Spurn light-vessel on a S.W. bearing, passing on either side of her as convenient. From her, Bull sand light-vessel bears W. by N. $\frac{1}{2}$ N., distant 4 $\frac{9}{10}$ miles, and in this track the black buoys on Stone Banks must be left on the starboard hand, and Chequer shoal buoy on the port hand.

In working, stand towards Stone Banks until Grimsby church appears in line with Bull light-vessel, bearing W. by N. $\frac{3}{4}$ N.; Spurn lights in line leads well to the eastward of the Sandhaile; and Grimsby church, kept in line with the westernmost windmill at Cleethorpe, N.W. by W., will lead over the north-east part of the flat in 12 feet.

In misty weather, steer in boldly for the land about Dimlington, keeping

the lead going. When the height has been sighted, continue along the land to the southward until Kilnsea beacon is seen. Beyond this point the ground is uneven, and the soundings cannot be depended upon, but from a depth of 8 fathoms, at 2 miles abreast the beacon, a S. ¼ E. course for 3 miles will lead to the Outer Banks buoy, and if continued, to Spurn light-vessel, when proceed as before directed.

A deep trench or gully half a mile wide, with 12 to 20 fathoms in it, runs through a flat of 6 and 9 fathoms in a W.S.W. direction towards the mouth of the Humber, passes just to the southward of Spurn light-vessel, and then runs in a curved form in mid-channel, but decreasing in depth and width to the southward of the Bull. This gully is often made use of by the Humber captains when approaching the river from the eastward in misty weather.

By Night.—While closing from the northward or eastward, keep Spurn floating light bearing to the westward of S.W. and between that and West; pass close to the southward of it, and then steer West, taking care not to bring Spurn floating light more easterly than E. ¾ N., to avoid Chequer shoal; when Spurn high light is N.N.W., a N.W. ½ W. course for 3 miles will lead up to the Bull light. In working, keep Bull light to the northward of W.N.W., in order to avoid the Stone Banks. If approaching the Humber from the south-eastward, keep Spurn low light obscured by the high lighthouse, bearing N.W., until Spurn floating light bears N. by E.; then make a W. by N. ½ N. course for 2¼ miles until the floating light bears E. ¾ N., when a N.W. ½ W. course for 3 miles will lead up to Bull light-vessel as before.

Caution.—As a general rule, no vessel should enter the Humber except in charge of a pilot, when one can be obtained, for the land on either side is so low that few sailing or clearing marks can be given, and everything depends upon the correct courses and distances being made, to insure which an intimate acquaintance with the set of the tide streams is necessary. A stranger, however, will do well to attend to the following special points:—

In entering the Humber, either running or working, due allowance must be made for the ebb stream which sets strongly across the Stone Banks, and also for the flood stream, which sets down upon the Sandhaile in a like degree. Their common rate during springs is about 4 knots; the ebb, however, runs more rapidly during freshes. North-west gales and a flood tide cause the highest sea at the mouth of the Humber.

Having the option, it is better to wait for daylight than to work by night. During heavy on-shore gales, the proper night track is to the southward of Spurn light-vessel.

In strong northerly gales and flood tide, many accidents have happened from vessels not keeping close enough to the Stone Banks, for having both tide and wind on their beam, they fail to fetch into the mouth of the Humber, are thrown to leeward upon Sandhaile flat, let go their anchors in broken water, and are lost.

Again, with southerly winds and ebb tide, vessels as often get upon the Stone Banks from not paying attention to the bearings of the Spurn and Bull sand light-vessels. The same accident also occurs to vessels from the southward with south-westerly winds running too far to leeward before hauling up, whereas, by keeping in a depth of 5 or 6 fathoms round the Sandhaile, they would have been led up to Bull sand light-vessel.

From Spurn Point to the Burcom.—If proceeding to Hawk road for shelter in easterly or north-easterly gales, give Spurn point a berth of half a mile, as it is too steep to be rounded by the lead; having passed the point, steer in to the northward, and cross the line of the lighthouses. In entering by night, keep well over towards Bull light-vessel, until Spurn lights have been brought to the eastward of N.E.; Spurn point will then have been passed, and Hawk road may be entered. For a description of this anchorage, see page 110.

In proceeding up the Humber, a N.W. $\frac{3}{4}$ N. course for $2\frac{1}{2}$ miles from Bull light-vessel will lead to a fair berth abreast Clee-ness buoy; and N.W. by W. $\frac{1}{2}$ W. for about 2 miles farther to abreast Grimsby road and the lower end of the Burcom. When working in the same district, the buoys to the north-eastward, and the Bull, Clee-ness, and Burcom buoys to the south-westward, sufficiently point out the channel.

By Night, from near Bull sand light, steer N.N.W. for one mile, and bring Killingholme lights in line bearing N.W. $\frac{3}{8}$ W., which is the leading mark through the channel nearly up to the lights.

Caution is necessary in approaching Middle sand, as it is liable to change.

Grimsby and Sunk roads have been described on page 110.

From the Burcom to Skitter Sand.—Killingholme lighthouses in line, N.W. $\frac{3}{8}$ W., is the mid-channel mark from the Burcom to about half a mile above No. 8 *black* buoy. In working, and being above the Middle light-vessel, open them a little either way, and be careful of the Burcom, Sunk spit, and Stallingborough flat, as they are steep-to. The Sunk spit, Holme ridge, and Holme buoys mark the north-eastern boundary of the channel.

From half a mile above No. 8 *black* buoy, Grimsby church, in line with Stallingborough ferry-house, bearing S. by E. $\frac{3}{4}$ E., leads westward of Halton Middle, and to abreast Killingholme haven. In working, open the

church a little either way; this will also clear the Clay Huts near the north-west part of the ridge. Their position is generally marked by the tide ripple. As, however, the above objects are low and distant, care must be taken not to stand up to the banks which are steep-to.

From abreast Killingholme haven, Killingholme high lighthouse and north low lighthouse in line, bearing S. ¼ W., leads up to the first Skitter buoy, No. 7, *black* and *white vertical stripes*; but the more direct course is, from about three-quarters of a mile above No. 8 *black* buoy, to proceed with Newsham Booth lighthouses in line, bearing South, which will lead westward of the Clay Huts, and eastward of Halton Middle. In standing eastward keep Paull village in sight outside Paull cliffs, and do not shoal less than 4 fathoms, and towards the flat of the Skitter to the same depth. It may here be observed that unless the lead is carefully and quickly attended to, it is little use in standing up to such dangerous sands as those of the Humber.

By Night, keep Killingholme high light and south-east low light in line, bearing N.W. ¾ W., until the leading lights at Newsham Booth appear in line, bearing South, when the high *white* light at Salt End will become visible; then steer North, keeping Newsham Booth lights in line, and the high light at Salt End a little on the starboard bow, until Killingholme high light and north low light are in line, bearing S. ¾ W., and the lights at Thorngumbald clough are also in line, S.S.E. ½ E., which course will lead clear of the Clay Huts, Halton Middle, and Skitter sand end.

Caution.—The flood stream splits abreast Sunk spit, or No. 6, *black* beacon buoy, one portion setting strongly over Holme ridge and through the main navigation, the other into the blind channel between Foul Holme sand and the north shore. Should a vessel in light winds be drawn into the latter set, an anchor must be promptly let go.

Whitebooth and Paull roads are described on page 111.

From Skitter Sand End to Hull.—The remainder of the channel up to Hull is curved and narrow, with rapid tide-streams setting through it. Newsham Booth lighthouses in line, bearing South, or Killingholme high lighthouse and north low lighthouse in line, bearing S. ¾ W., will lead clear of Skitter sand end, and to the eastward of the *black* and *white vertically striped* buoy, No. 7; half a mile above which the lighthouses at Thorngumbald clough, to the southward of Paull, appear in line, S.S.E. ½ E.; then, the low lighthouse kept a little open westward of the high lighthouse will lead in mid-channel, until the lighthouses at Salt End show in line, S.E. by E. ¼ E., which latter mark will guide a vessel up to the lower part of Hull road. Throughout this portion of the channel the *black* and *white vertically striped* buoys of the Skitter will be on the port hand, and the Hebbles *black* buoys on the starboard hand.

At Night, Newsham Booth lights in line, bearing South, or Killingholme high light and north low light in line, bearing S. ¾ W., serve as leading lights until abreast Paull village; when the low light at Thorngumbald Clough will appear a little open westward of the high light, to lead up to the second turn in the channel; where the lights at Salt End showing in line, S.E. by E. ¼ E., will then guide up to the lower part of Hull road.

Caution.—It must be remembered that through the shifting nature of Skitter and Hull Middle sands, this is the most critical portion of the navigation of the Humber, and as a mistake would be attended by the most serious consequences, great care should be observed in carefully following the above directions. Hull Middle sand has lately been found to have grown up and extended to the northward and eastward; vessels drawing 15 feet and upwards, when rounding its northern end, should not bring the high light at Salt End open southward of the low light, and must give buoy, No. 10, a good berth. *See* page 109.

Great caution is necessary while in the vicinity of the Hebbles, for the flood stream sets obliquely upon the shoal.

TIDES.—It is high-water, full and change, at Spurn point at 5h. 26m.; springs rise 18¾ feet, neaps 15 feet, and neaps range 10¾ feet. At Grimsby, at 5h. 36m.; springs rise 19¼ feet, neaps 15¼ feet, and neaps range 11 feet. At Killingholme, at 6h. 2m.; springs rise 19¾ feet, neaps 15¾ feet, and neaps range 11½ feet. At Hull, at 6h. 29m.; springs rise 20¾ feet, neaps 16¼ feet, and the range of neaps is 11¾ feet. At Goole, at 7h. 26m., or 57m. after high-water at Hull; springs rise 13½ feet, and neaps range 9 feet. During freshes, the tide stream is said to run 5 or 6 knots per hour through Blacktoft road, and 3 to 4 knots over the river generally.

The Humber above Hull.—For the guidance of vessels navigating the Humber above Hull, the Corporation of the Trinity House at Hull have erected several high and low beacon lights on either shore of the upper Humber. In consequence of the ever-varying state of the shoals in the river the low beacon lights are fitted on tramways, and are moved as requisite to mark the channels. A light-vessel is anchored off the pitch of Whitton ness; she is also moved as the channel alters.

CHAPTER V.

HUMBER TO CROMER, WITH BOSTON AND LYNN DEEPS.

VARIATION, 18° 25′ to 17° 40′ West in 1882.

THE deep bay between the coasts of Lincolnshire and Norfolk, indifferently termed Lynn Deep and the Wash, is for the most part occupied by numerous and dangerous sands, some lying out a considerable distance in the offing, and others skirting the main; and through these the several rivers which have their outlets in the Wash find their way at low-water. The rapidity of the tides in this inlet, and the low character of its shores, which, owing to the mist that almost constantly hangs about them, are generally indistinct from a moderate offing, render this the most difficult portion of the navigation on the eastern coast; and an intimate acquaintance with it, and a more than common degree of vigilance is necessary when using it, to prevent accident.

The COAST.*—The western boundary of the Wash consists of extensive marsh lands, the northern portion of which is bounded by sand-hills, but the southern part is so low as to require embankments for its protection. From Donna Nook, at the entrance of the Humber (page 103), the coast is fronted by sand-hills to Saltfleet, where is a conspicuous windmill and much wood.

SALTFLEET was formerly a considerable market town, but the greater part of it was destroyed by an inundation of the sea. Abreast are some noted oyster grounds. A rocket apparatus is kept at Saltfleet in case of wreck.

THEDDLETHORPE.—The coast to the southward of Saltfleet consists of the same character, and several churches appear behind it; those of East and West Theddlethorpe stand prominently forward near the coast-line, and a clump of trees is seen between them when East Theddlethorpe church is on a S.W. by W. ¾ W. bearing.



East and West Theddlethorpe churches, S.W. by W. ¾ W.

* *See* Admiralty chart of east coast of England, sheet IV., Cromer to Trusthorpe, with views, No. 1,455; scale, mile = 0·5 inch.

TRUSTHORPE church also is close behind the sand-hills, with a black windmill and a long high sand-hill a little to the northward, and a coastguard station one mile to the southward of it. Beyond Trusthorpe, the sand-hills are of moderate height for a mile or two, with a few houses showing here and there between and upon them; they then decline, being in some places not more than 15 to 20 feet in height, and the shore is defended by extensive groynes.

INGOLDMELLS POINT.—A large white house with red tiles and three stacks of chimneys, stands on the sand-hills one mile to the northward of Ingoldmells point; and another house, blue slated and white-washed, is a mile to the southward of the point, which may readily be known by these objects. Within the point, Addlethorpe and Ingoldmells churches, used as marks for the swashway between Docking shoal and Burnham flats are very plain objects.



Addlethorpe church, W. ¾ N.



Ingoldmells church, W. ¾ S.

The remainder of the coast to Gibraltar point is low, few of the sand-hills being 20 feet high, and several windmills are seen a little distance behind them. Winthorpe church is a bold object, but the stunted square tower of Skegness church will scarcely be seen above the sand-hills from any direction.



Winthorpe church, W. by N. ¾ N.

Pier and Lights.—A promenade and landing pier, 620 yards in length, and formed on iron piles, extends in an east direction from Skegness. There is a depth of 23 feet at the outer end of the pier at high-water of ordinary springs, but it is dry at low-water.

At night, two *fixed white* lights, placed vertically, are shown from a staff at the pier-head.

From Gibraltar point to the head of the Wash, the shore is low and embanked.

Life-Boats, rockets, &c., are stationed at Theddlethorpe, Sutton, Chapel, and Skegness.

DANGERS off the COAST.—All the coast above described is fronted by a shoal-water flat of varying breadth, upon which is Rosse sand, near Donna Nook, with from one foot to 6 feet over it.

Buoy.—A conical buoy, *striped vertically black* and *white*, and marked Rosse spit, lies in 4½ fathoms; with a clump of trees in the marsh, open north of a small house, the second north of Donna Nook beacon, bearing W. ¼ N.; Saltfleet mill, S.W. by W., distant $5\frac{7}{10}$ miles; Donna Nook beacon, W. ¼ N., $4\frac{7}{10}$ miles; Sandhaile buoy, N.N.W. ½ W., $3\frac{7}{10}$

miles; Spurn high lighthouse, N.N.W. $\frac{3}{4}$ W., $7\frac{1}{2}$ miles; Spurn light-vessel, N. $\frac{1}{2}$ W., $4\frac{1}{10}$ miles; and Protector buoy, S.S.E. $\frac{1}{4}$ E., 7 miles.

Theddlethorpe Middle, and the Clay Huts, uneven patches of ground near Theddlethorpe and Trusthorpe, are too close in to need special description. There are, however, several shoals in the offing, as follow:—

Saltfleet, Theddlethorpe, and Trusthorpe Overfalls are patches with $2\frac{1}{4}$ to 4 fathoms upon them, lying out from 2 to 5 miles from the main, abreast the respective places from which they take their names; all lie inshore of the track of large ships, and there is plenty of water over them for small vessels.

PROTECTOR OVERFALLS, $2\frac{1}{2}$ miles outside of Saltfleet Overfalls, consist principally of a ridge of sand extending in a north and south direction for 2 miles, with only 9 feet upon the shoalest part, but having 7 fathoms on each side within the distance of one mile; Saltfleet mill is about W.N.W., 8 miles from the middle of it. There are also detached patches of 3 and $3\frac{1}{2}$ fathoms one mile to the southward. Lying so far off shore, these shoals are greatly in the way of vessels proceeding from the Humber to Lynn Deep.

Buoy.—A *black* conical buoy lies in $4\frac{1}{4}$ fathoms 3 cables to the eastward of the shoalest part of the sand; from it, a grove of trees, in line with West Theddlethorpe church, bears W. $\frac{1}{4}$ N.; South Somercotes church spire is open northward of Saltfleet mill, W.N.W.; Donna Nook beacon bears N.W. $\frac{1}{4}$ W.; distant $10\frac{1}{10}$ miles; Spurn light-vessel, N. by W. $\frac{1}{2}$ W., $11\frac{1}{2}$ miles; and North Inner Dowsing buoy, S. by E. $\frac{3}{4}$ E., 8 miles.

INNER DOWSING is an extensive shoal, S.S.E., 6 miles from Protector Overfalls; it is $5\frac{1}{4}$ miles long S. by W. $\frac{1}{4}$ W. and N. by E. $\frac{1}{4}$ E., is narrow, and has for the most part a depth of only 4 to 6 feet over it at low-water. A gully, with 10 to 16 fathoms in it, runs parallel to the Inner Dowsing, one mile within it; outside the shoal, the depth is 10 or 11 fathoms over even ground. There are, besides, a cluster of 2-fathoms patches named Inner Dowsing Overfalls, one mile to the westward of its north extremity; and a detached 3-fathoms ridge one mile to the south-eastward of the south extremity. These dangers are in the fairway of vessels bound to Lynn Deep.

INNER DOWSING LIGHT-VESSEL lies in 10 fathoms at low-water near the north-east end of the Inner Dowsing. The light, which is 38 feet above the sea, is a *revolving green* light showing a *flash every twenty seconds*, and should be seen in clear weather at the distance of 10 miles. In order to render this vessel readily distinguishable in the day

from the other light-vessels in the vicinity, two globes are borne on the mast, one above the other.

Fog Signal.—In thick or foggy weather a gong is sounded.

From the vessel, North Inner Dowsing buoy bears S.W. by W., distant one mile; South Dowsing buoy, S.S.W., $5\frac{8}{10}$ miles; North Race bank buoy, S.E. by S., 8 miles; and Dudgeon light-vessel, S.E. $\frac{1}{2}$ E., $13\frac{8}{10}$ miles.*

BUOYS.—North Inner Dowsing, can buoy, *striped horizontally black* and *white*, lies upon the north end of the Inner Dowsing, in 5 fathoms; with Trusthorpe church bearing N.W. by W. $\frac{1}{2}$ W., distant $10\frac{1}{4}$ miles; Boston bar, S.W. (westerly), 12 miles; Lynn Well light-vessel, S.W. $\frac{3}{4}$ S., $17\frac{1}{2}$ miles; Protector buoy, N. by W. $\frac{3}{4}$ W., 8 miles; Dudgeon light-vessel, S.E. by E. (easterly) $14\frac{1}{10}$ miles; South Dowsing buoy, S. by W. $\frac{1}{2}$ W., $5\frac{2}{10}$ miles; and Inner Dowsing light-vessel, N.E. by E., one mile.

South Dowsing, a cylindrical buoy, with *black* and *white horizontal stripes*, lies in 6 fathoms, at the south end of the Inner Dowsing; with the south end of Welton wood, just open to the northward of the Old hotel, bearing W. by N. $\frac{1}{2}$ N.; Ingoldmells church, W. by N., distant $8\frac{6}{10}$ miles; North Inner Dowsing buoy, N. by E. $\frac{1}{2}$ E., $5\frac{2}{10}$ miles; Docking buoy, E. $\frac{1}{2}$ S., $4\frac{3}{10}$ miles; Burnham Flats buoy, S. $\frac{1}{4}$ E., $4\frac{8}{10}$ miles; Lynn Well light-vessel, S.W., $12\frac{9}{10}$ miles; and Inner Dowsing light-vessel, N.N.E., $5\frac{8}{10}$ miles.

Overfalls, a conical buoy, *striped vertically black* and *white*, and surmounted by a staff and cage, lies on the north-west side of Inner Dowsing overfalls, in 7 fathoms; with Inner Dowsing light-vessel bearing E. by S., distant $2\frac{1}{2}$ miles; and North Inner Dowsing buoy, S.E. by E., 2 miles.

TIDAL STREAMS.—Between the Spurn and Inner Dowsing the flood-stream sets S.S.W., but near the Inner Dowsing the flood-set is S.W. by W., and that of the ebb, N.E. by E.

SKEGNESS MIDDLE.—The flat which fronts the Lincolnshire coast (already alluded to) shelves gradually from the main to the 4-fathoms edge; the breadth is 2 miles abreast Saltfleet, and $4\frac{1}{2}$ miles abreast Ingoldmells point; from whence the flat trends south-westerly, and becomes merged in the shoals forming the bar of Boston Deep. A narrow ridge with 5 feet on it, named Skegness Middle, extends in a north-easterly direction from the shore abreast Skegness.

Buoy.—A *black* can buoy lies off the north-east end of Skegness Middle.

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* *See* Regulations respecting light-vessels, footnote, page 101.

WAINFLEET ROAD, or (as it is locally termed) "Between the Knock and the Main," is a narrow channel formed between the shore and Boston Knock, one of the boundaries of Boston bar. Vessels driven out of Lynn Well by strong southerly and south-westerly winds often take shelter here and ride securely, and vessels have also been known to ride safely in it in strong north-easterly gales. The roadstead, however, is not so available when Wainfleet swashway happens to become closed, for then it is a blind channel without a southern outlet. In entering from the northward, keep within one mile of the land, and anchor with Gibraltar house bearing from West to W.N.W., about one mile distant, in $2\frac{1}{2}$ or 3 fathoms, mud and clay. In every part of the road the anchors hold well, and the farther up the less sea.

CAUTION.—The seaman must be careful in entering Wainfleet road, not to get within Skegness Middle, a mistake often made. A depth of $3\frac{1}{2}$ fathoms will lead outside it.

WAINFLEET HARBOUR is formed by the outlet of the river Steeping, which passes Gibraltar point with a winding course to the south-west and south-eastward, and then discharges itself into Wainfleet road. The entrance is marked by two can buoys, *striped vertically black* and *white* on the port hand, and *black* on the starboard side, and the channel farther in is beaconed by stakes. The bar is five feet above low-water; it has consequently 15 feet over it at high-water springs; there is 12 feet in the channel as far as Gibraltar house, and 8 feet at the sluices, $1\frac{1}{2}$ mile above it, where the navigation ends, but owing to the small amount of backwater, the channel throughout is very narrow.

Wainfleet, 5 miles in-shore of Gibraltar point, is scarcely visible from the sea. Before the decay of its harbour it was a place of importance, and supplied two ships of war to the expedition against Brittany in 1359. Now it has but a small coal trade, and employs only a few vessels. Fishermen act as pilots for the place when required. The principal difficulty in entering is occasioned by the irregular set of the flood-tide across the entrance channel.

Wainfleet Swashway, a narrow passage between the Inner Knock and Wainfleet sands, thus connecting Wainfleet road with Boston Deep, had, in 1871, 7 to 13 feet at low-water springs; it has two small buoys at its north-east entrance; and a *chequered red* and *white* can buoy at the south-west end of the Inner Knock, and Wainfleet *black* buoy mark its opposite end. This swashway is, however, sometimes blocked up, as was the case in 1867, and cannot therefore be depended upon.

BOSTON DEEP.

Boston Deep begins abreast Skegness, and terminates at Clay Hole, near the entrance of the Witham; it is about 16½ miles in length, with an average width of one mile, and is bounded by Boston Outer and Inner Knocks, Wainfleet sand, and the extensive flat skirting the main, to the north-westward, and by the Dogs Head, Long sand, and other sands, which partly dry at low-water, to the south-eastward. The general depths throughout the Deep vary between 4 and 6 fathoms.

BOSTON BAR, as the entrance to Boston Deep is called, is a passage one-quarter of a mile wide, between lower portions of Boston Knock and Dogs Head sands, which lie in a direction nearly parallel to the shore; the former sand is some distance within the bar, uncovered at about two-thirds ebb, and the latter also dries at low-water; both are subject to change. There was a depth of 10 feet upon the bar at low-water springs in 1871.

BUOYS.—The channel across the bar is marked on the starboard hand in entering by the Outer Knock, *black* nun, with staff and ball; and the Inner Knock, a *black* can; and by two *black* and *white vertically striped* can buoys, Outer and Inner Dogs Head, on the port hand. The position of these buoys may always be relied on, as they are shifted immediately any change occurs.

The north-western boundary of Boston Deep, within the Inner Knock bar buoy, is clearly defined by *black* can buoys, namely, four upon the Outer Knock, two along Wainfleet sand, then occur the three Scullridge buoys (the outer one conical with staff and triangle), and the others are distributed along the margin of the flat, the third buoy above the Inner Scullridge, named High Horn, has a staff and ball, and lies with Boston and Freiston churches nearly in line. Vessels bound to Boston usually anchor abreast, or a little above this buoy.*

The sands on the south-eastern side of the Deep are marked by six can buoys, *striped vertically black* and *white;* the first being on Outer Dogs Head sand, S. by W. ½ W., 9 cables within the Inner Dogs Head bar buoy, the next is four miles farther up, off the south-west end of Inner Dogs Head sand, then three buoys mark the western half of Long sand, and the sixth buoy is at the north extreme of Bar sand.

The narrow portion of the channel upwards is buoyed on either side, the same arrangement as to colours being continued.

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* *See* Admiralty chart of the Wash, Skegness to Blakeney, No. 108; scale, mile = 0·95 inch.

SCULLRIDGE, nearly 8 miles within Boston bar, is a narrow sand having patches with 6 feet over them at low-water; it is above 2 miles in length from a depth of 3 fathoms at each end, and lies in the direction of, and midway across, the Deep.

Buoys.—The channel, which was formerly to the northward of this sand, having shoaled up, the buoys have been moved to mark the south side of the sand; they are now *black* buoys, and are named Outer, Middle, and Inner Scullridge; the outer buoy is conical with staff and triangle, the others are cans.

Directions.—Boston bar bears S.W. (westerly), 12 miles from North Inner Dowsing buoy; W. by S., 11¾ miles from the Docking buoy; W. by N. ¼ N., 7½ miles from Burnham flats buoy; and S. ¾ E., 4 miles from Ingoldmells point.

Bound to Boston Deep from round the north end of the Docking, or from the direction of the Humber, as the case may be, and being about 2 miles off shore, with Addlethorpe church open to the westward of Ingoldmells church, the buoys marking the channel across Boston bar will be seen to the south-westward. The course between them is generally S.W. by S. for about one mile, the *black* buoys being to the north-west, and the *black* and *white vertically striped* buoys to the south-east.

Boston bar may be crossed in the strongest gale from the north-east or eastward, for but few accidents have been known to happen from doing so. Vessels drawing 9 feet may pass it at any time of tide in moderate weather, and those of 14 or 15 feet at first-quarter flood. It is usual to keep on the Dogs Head side, as the bar is there narrower, and the water deeper; and should a vessel touch the ground, the flood-stream would set her from the shoal instead of upon it.

CAUTION.—In approaching Boston bar, it is necessary to guard against shifting ridges of sand that sometimes form a quarter of a mile to the northward of Boston Knock buoy.

As Boston bar is not lighted, no vessel should attempt to cross it at night.

Above the Dogs Head and Knock buoys, the Deep becomes wider, and the course, from the outer buoys about S.W. by S., for one mile, is then S.W. ½ S., 2¼ miles, to abreast the buoy at the south-west end of the Outer Knock, from whence a S.W. by W. course for 4½ miles will lead to the Outer Scullridge buoy. The channel is now to the southward of that shoal, and a W. by S. (southerly) course for 6¼ miles will lead between the three *black* buoys marking it and the *black* and *white vertically striped* buoys on Long sand, and up to the High Horn buoy, where anchor and obtain a pilot. In working, tack on the first shoal cast, as both sides are steep.

Vessels formerly anchored in Clay Hole, on the north-west side of Herring sand, but this anchorage has silted up considerably of late years, and there is now only 6 to 10 feet depth in it at low-water. Here the Boston pilot-vessel rides. In winter nights she carries a bright light during the flood, and until half-ebb.

During north-east gales there is considerable weight of sea in the Deep from half-flood to half-ebb, but, as a general rule, it is observed that the farther up the less sea. In northerly gales, vessels ride more securely in Boston Deep than in the more exposed anchorage, Lynn road. The best position is above the Scullridge, where is ample room, and the bottom is sand and clay; below the Scullridge, the bottom is sand and loose stones. Boston Deep is also specially available for vessels that have lost their anchors, and are unable to reach the Humber, for they may be laid ashore upon the soft ground abreast Clay Hole without sustaining any damage.

TIDES.—Off Boston bar, the flood-stream sets W.S.W., and the ebb E.N.E.; both run strongly through the swashways across Long sand when it is uncovered; with this exception, the sets are generally fair up and down the Deep, and both streams cease at the time of high and low water upon the shore. At Clay Hole, springs rise 23 feet 4 inches, and neaps range 9 feet 2 inches, for which due allowance must be made when taking up an anchorage.

For Boston South channel, Boston, and Spalding, *see* pages 134–137.

LYNN DEEP.

Dogs Head, Long sand, and Roger, the sands which form the south-eastern boundary of Boston Deep, constitute also the north-western boundary of Lynn Deep; they partly dry at low-water, and are, for the most part, very steep to the south-eastward; this is especially the case about the hook or elbow of Long sand. These sands are separated from each other by low-water swashways, named the Parlour and Trap, passages well known to the coasters, but too obscure for a stranger to use.

LYNN KNOCK lies abreast of, and nearly parallel to, the Dogs Head, the channel between them being a little more than one mile wide, with 5 and 6 fathoms in it. This shoal is 2 miles long in a N. by E. ¾ E. and S. by W. ¾ W. direction; 7 feet is the least water upon it, and it is steep-to on both sides. It is very much in the way of vessels bound up the Deep.

BUOYS.—Two buoys, separated by one mile, mark this shoal.

North Lynn Knock, a conical buoy *striped horizontally black* and *white*, with staff and diamond, lies in 6½ fathoms on the east side of the

shoal; with a large building next west of the coast-guard station, its width to the northward of a wood on the back land, bearing N.N.W. ½ W.; Skegness church, over north end of a sand-hill, N.W. ⅞ N.; Burgh church, open northward of a house with a flagstaff, and in a gap of the sand-hills, N.W. ¼ N.; South Lynn Knock buoy, S.S.W. ¾ W., distant one mile; Boston Outer Knock buoy, N.N.W., $3\frac{1}{10}$ miles; Burnham Flats buoy, E. ½ N., $6\frac{7}{10}$ miles; Docking buoy, E.N.E. (northerly), 11⅔ miles; and North Inner Dowsing buoy, N.E. ¾ N., 13 miles.

South Lynn Knock, a can *striped horizontally black* and *white*, lies in 4½ fathoms on the south end of the shoal; with Hunstanton lighthouse, in line with the middle of a long wood, bearing S. ⅔ W.; and a mill on the back land, in line with a house at the north end of a wood next west of Burgh church, N.W. ⅔ N.; Burnham Flats buoy, E. by N., distant $7\frac{4}{10}$ miles; North Inner Dowsing buoy, N.E. ⅔ N., 13¾ miles; Outer Dogs Head buoy, N. ⅔ W., 3½ miles; and Lynn Well light-vessel, S.W. by S., 3½ miles.

LYNN WELL is a deep water trench or gully, with 16 to 27 fathoms in it, occupying the centre of Lynn Deep. It begins about East 3 miles from Lynn Knock, and running S.W. by W. ½ W. for 10 miles, with an average width of three-quarters of a mile, ends 1½ mile above the hook of Long sand. This feature serves, in misty weather, as a useful guide to vessels bound up Lynn Deep.

A LIGHT-VESSEL is moored in Lynn Well, in 17½ fathoms, $1\frac{9}{10}$ mile outside the dry part of the hook of Long sand, and exhibits a *revolving white* light, showing a *flash every twenty seconds*,* 36 feet above the water, and visible in clear weather at the distance of 10 miles.

Fog Signal.—A gong is sounded during thick or foggy weather.†

The vessel lies with Docking poorhouse, touching the south side of Ringstead windmill, bearing S.S.E.; a gap in Sedgeford wood, in line with Hunstanton terrace, S. by E. ¼ E.; and Ingoldmells mill, open to the westward of Winthorpe church, North; Hunstanton lighthouse, S. by E., distant $5\frac{1}{10}$ miles; Sunk buoy, S.S.W. (southerly), $3\frac{8}{10}$ miles; South Lynn Knock buoy, N.E. by N., 3½ miles; Docking buoy, N.E. by E. (easterly), nearly 16 miles; Burnham Ridge buoy, N.E. by E. ⅓ E., $8\frac{1}{10}$ miles; Burnham Flats buoy, N.E. by E. ⅔ E., $10\frac{1}{10}$ miles; outer buoy of the Roaring Middle, S.W. by W., 6 miles; and the Roger buoy at the entrance of Boston South channel, W. by S. ⅔ S., $8\frac{1}{10}$ miles. No ship should attempt to pass to the north-westward of the light-vessel.

* The Trinity House, London, has given notice that it is intended in the spring of 1882 to alter the period of revolution of Lynn Well light from *twenty seconds* to *ten seconds*. 28th December, 1881.

† *See* Regulations respecting light-vessels, footnote, page 101.

The south-eastern side of the entrance to Lynn Deep is bounded by an extensive mass of shoals, projecting in a triangular form from the coast of Norfolk. To the eastward they are broken and irregular, gradually shelving into deeper water; but their north-western edge is well defined, and very steep, the lead, while passing over it, quickly falling from 2 fathoms into 7 or 10 fathoms.

DOCKING SHOAL, the north-easternmost of these dangers, lies more than 10 miles from the main abreast Ingoldmells point, and a channel $2\frac{1}{2}$ miles wide, with 13 and 14 fathoms in it, separates it from the ridge near the south tail of the Inner Dowsing. This shoal is triangular, and, considering a depth of 4 fathoms as its boundary, it extends from its south-western point 5 miles north-easterly, and 6 miles south-easterly. It nearly dries at its south-west end, and there are several one-fathom and 2-fathoms patches distributed over its irregular surface.

BUOYS.—North-east Docking, a spherical buoy, *striped horizontally red* and *white*, with staff and triangle, lies in $9\frac{1}{2}$ fathoms near the north extremity of the Docking; from it, the north buoy of Race bank bears E. $\frac{1}{4}$ S., distant 2 miles; North Inner Dowsing buoy, N.N.W. $\frac{1}{2}$ W., $6\frac{1}{4}$ miles; South Dowsing buoy, W. $\frac{1}{2}$ N., $4\frac{3}{10}$ miles; Burnham Ridge buoy, S.W. $\frac{1}{2}$ W., $7\frac{1}{4}$ miles; Lynn Well light-vessel, S.W. by W. (westerly), nearly 16 miles; Hunstanton lighthouse, S.W. $\frac{1}{4}$ S., $18\frac{4}{10}$ miles; Burnham Flats buoy, S.W. $\frac{1}{4}$ S., $5\frac{8}{10}$ miles; Boston bar, W. by S., $11\frac{7}{10}$ miles; South Race bank buoy, S.E. $\frac{3}{4}$ S., 10 miles; and Blakeney Overfalls buoy, S.S.E. $\frac{1}{4}$ E., $16\frac{1}{10}$ miles.

West Docking, a can buoy, *striped vertically black* and *white*, lies near the west end of Docking shoal in 6 fathoms; with Burnham Flats buoy bearing S.W. by W. $\frac{1}{2}$ W., distant $\frac{8}{10}$ mile; South Dowsing buoy, N. by W., $4\frac{1}{2}$ miles; and Docking buoy, N.E. $\frac{1}{4}$ N., $5\frac{2}{10}$ miles.

S.E. Docking, a *chequered black* and *white* can buoy, lies in $4\frac{1}{2}$ fathoms at the south-east extremity of the Docking; with Cromer lighthouse bearing S.E. $\frac{3}{4}$ S., distant $22\frac{1}{3}$ miles; Blakeney Overfalls buoy, S.E. $\frac{1}{2}$ S., $9\frac{6}{10}$ miles; South Race bank buoy, E. $\frac{1}{2}$ S., $5\frac{3}{10}$ miles; and Burnham Flats buoy, N.W. by W., 6 miles.

BURNHAM RIDGE is a small shoal conforming in its direction to the north-west margin of Burnham Flats, and lying one mile to the westward of the portion which dries near their north end; it is about $1\frac{1}{4}$ mile long, and one-quarter of a mile wide, 3 fathoms is the least water over it, and there are 7 and 10 fathoms close to on either side.

Buoy.—A *chequered black* and *white* can buoy lies half a mile to the north-west of the Ridge, in 8 fathoms; with Ringstead windmill, in line with

Holme church, bearing S.S.W. $\frac{1}{4}$ W.; and Burnham Norton church, over the middle of the high part of the Scald head, S. $\frac{1}{8}$ E.; Hunstanton lighthouse, S.W. by S., distant $11\frac{5}{10}$ miles; North Lynn Knock buoy, W. $\frac{1}{2}$ S., $4\frac{6}{10}$ miles; Docking buoy, N.E. $\frac{1}{2}$ E., $7\frac{7}{10}$ miles; North Inner Dowsing buoy, N. by E. $\frac{1}{2}$ E., 12 miles; Burnham Flats buoy, E. $\frac{3}{4}$ N., 2 miles; and Lynn Well light-vessel, S.W. by W. $\frac{1}{4}$ W., 8$\frac{1}{2}$ miles.

BURNHAM FLATS, to the south-west of Docking shoal, are separated from it by a swashway three-quarters of a mile wide, with a low-water depth of 4 to 6 fathoms in it. The flats are connected with the shore of Norfolk; their north-west side, as in the case of the Docking, is steep, while their surface is very irregular, with only one foot to 6 feet water over a considerable portion of it, and at the north end the sand dries one foot for a third of a mile at low-water.

Buoy.—A conical buoy *striped horizontally black* and *white*, with staff and St. Andrew's cross, lies in 10 fathoms, at the north-east extremity of the flats, and marks the south-west boundary of the swashway. At it, Addlethorpe church is open thrice its length to the northward of Ingoldmells church, bearing N.W. $\frac{7}{8}$ W.; Hunstanton lighthouse bears S.W. $\frac{1}{2}$ S., distant $12\frac{4}{10}$ miles; Burnham Ridge buoy, W. $\frac{3}{4}$ S., $1\frac{7}{10}$ mile; North Lynn Knock buoy, W. $\frac{1}{2}$ S., $6\frac{7}{10}$ miles; Boston bar, or Outer Knock buoy, W. by N. $\frac{1}{8}$ N., $7\frac{7}{10}$ miles; Docking buoy, N.E. $\frac{1}{4}$ N., 6 miles; West Docking buoy, E.N.E., $\frac{5}{10}$ mile; South Dowsing buoy, N. $\frac{1}{4}$ W., $4\frac{8}{10}$ miles; South Race buoy, E. by S. $\frac{3}{4}$ S., $10\frac{8}{10}$ miles; West Sherringham buoy, S.E. $\frac{3}{4}$ E., 23 miles; Blakeney Overfalls buoy, S.E. $\frac{1}{3}$ E., $15\frac{3}{10}$ miles; Blakeney church, S.S.E. $\frac{7}{8}$ E., 18$\frac{1}{2}$ miles; and Lynn Well light-vessel, S.W. by W. $\frac{3}{8}$ W., 10 miles.

WOOLPACK, MIDDLE, and SUNK.—From the swashway, the steep north-western face of Burnham flats (slightly concaved) extends S.W. by W. for 12$\frac{1}{2}$ miles, and then turning abruptly to the southward, joins the shoals upon the shore of Norfolk at the head of Lynn Deep. The Woolpack, with one foot over it, and the Middle, and Sunk, which dry at low-water 10 and 6 feet, are upon and near the edge of the flats.

Buoys.—A can buoy, *chequered black* and *white*, lies to the westward of the western spit of the Woolpack, in 5$\frac{1}{2}$ fathoms; with Hunstanton church, in line with the centre of the new church at St Edmunds, bearing S.S.W.; Holkham church, S.E. $\frac{1}{4}$ S.; Lynn Well light-vessel, W. $\frac{1}{4}$ N., distant $3\frac{8}{10}$ miles; and South Lynn Knock buoy, N.N.W. $\frac{3}{4}$ W., $3\frac{6}{10}$ miles.

A can buoy, *striped vertically black* and *white*, lies near the south-west end of the South Sunk, and serves, with Gore Middle buoy (described on page 152), to lead through Gore channel or Bays, a narrow passage between Burnham flats and the shore.

FERRIER OUTER MIDDLE, a similar patch upon the edge of the flats, to the south-westward of the Sunk, is marked by a can buoy, *striped vertically black* and *white,* while the buoys at the entrance of Bull-dog channel lie 1½ mile to the south-westward; but further notice of them is unnecessary, as they are out of the way of the main navigation.

The HEAD of LYNN DEEP is occupied by extensive sands, mostly trending to the north-eastward; they are separated from each other by narrow channels, the remains of former outlets of the Ouse, the river having gradually worked its way to the westward. The Ferrier, Pandora, Middle banks, Seal, Thief, and other sands, dry in several instances 8 and 11 feet. The Thief is marked by a life-beacon near its south-west elbow. The Roaring Middle and Whiting, the westernmost of this group of sands, form together the south-east boundary of the approach to Lynn channel and road.

MIDDLE.—A patch of 18 feet, lying half a mile N.E. by E. from the outer buoy of the Roaring Middle, and S.W. by W. 5 miles from Lynn Well light-vessel, is what remains of Middle bank.

ROARING MIDDLE lies in a S.W. ½ W. and N.E. ½ E. direction, and is connected to the Whiting; it is very narrow, and dries at low-water to the extent of one mile.

Buoys.—A large nun buoy, *striped vertically black* and *white,* with a staff and ball, lies in 5 fathoms, near its north-east end; with Ringstead windmill, in line with the largest white mark upon the face of the west end of Hunstanton cliff, bearing E. by S. ¾ S.; and Boston church, open a little to the westward of Freiston church, N.W. by W. ½ W.; Lynn Well light-vessel, N.E. by E., distant 6 miles; and Hunstanton lighthouse, E. by S. ¾ S., 6 1/10 miles. The light at Hunstanton shows *red* between the bearings S.E. by E. ¼ E. and E. by S. ¾ S. The north-west side of the Roaring Middle is afterwards marked by a tall nine-pin buoy, and by two can buoys; *they are striped vertically black* and *white,* and are numbered upwards 1, 2, and 3, respectively, No. 3 lying S.E. by E. ½ E., half a mile from Wisbeach bar buoy.

WHITING is in continuation from the Roaring Middle to the south-westward, and the greater portion of it dries at low-water springs. It bends gradually round from the south-west to the southward, its inner or south-western face forming the north-eastern boundary of Lynn road. A life-beacon* was erected in 1812 upon this sand, and it is further marked by several *black* and *white vertically striped* buoys, following in continua-

* There are life-beacons upon several of the sands seaward of Lynn road; they are shifted occasionally as the sands alter in form and height.

tion those upon the Roaring Middle; and by the Elbow and another beacon.

The shoals bounding the approaches to Lynn, Wisbeach, and Boston, will be noticed under the heads of the several ports.

Directions.—Vessels bound up Lynn Deep pass between the Docking and Inner Dowsing, or between the latter shoal and the coast of Lincolnshire. The channel to the westward of Lynn Knock cannot be recommended as safe, for it is narrow; a strong in-draught into Boston Deep sets across it, and no good marks for it can be given.

The swashway between Docking shoal and Burnham flats is N.W. (westerly), 15 miles from the bell buoy at the east end of Blakeney Overfalls. Addlethorpe church tower, open four times its breadth to the northward of the tower of Ingoldmells church, bearing N.W. $\frac{3}{4}$ W., leads through close to the beacon buoy upon Burnham flats.

The inn at the north-west corner of the village of Hunstanton St. Edmonds (*see* view on page 151) showing to the westward of Hunstanton lighthouse, bearing S.W. $\frac{1}{2}$ S., leads between the Docking and the Inner Dowsing, and clear of the north-western edge of Burnham flats nearly up to the Woolpack, or until Lynn Well light-vessel has been brought on a W. by S. (southerly) bearing, when it is advisable, if working, to stand to the westward so as to avoid the Woolpack, Middle, and Sunk. A vessel should not go into less than 7 fathoms when standing towards the Woolpack and the Middle, nor towards the Sunk into less than 10 fathoms, as they are steep-to.

It must be remembered that the inn showing to the westward of Hunstanton lighthouse, bearing S.W. $\frac{1}{2}$ S., leads to the eastward of Burnham ridge.

Snettisham spire (*see* view, page 151), in line with Hunstanton lighthouse, bearing S. by W., leads to the eastward of the sands forming Boston bar, and also of Lynn Knock.

Pass to the south-eastward of Lynn Well light-vessel whether running or working, and keep her to the westward of S.W. $\frac{3}{4}$ W. while closing her, and E.N.E., after she has been passed, for about $5\frac{1}{2}$ miles, when Hunstanton lighthouse will bear S.E. by E. $\frac{1}{2}$ E., and the course to Bar Flat light-vessel at the entrance of Lynn channel is S.W. From Lynn Well light-vessel, the north-east buoy of the Roaring Middle bears S.W. by W., distant 6 miles.

By Night, vessels pursuing the track between the Inner Dowsing and the coast of Lincolnshire, usually keep in a depth of 5 or 6 fathoms, and steer the coasting course; and when the water deepens to 8 or 9 fathoms, the Well will be opening and Hunstanton light will probably be in sight. This must be kept bearing S. by W. $\frac{1}{2}$ W. until Lynn Well light appears

W., the proper bearing for closing her; pass to the south-eastward of the light-vessel, and keep her bearing E.N.E., until the colour of Huntanton light changes from *white* to *red*, when the usual night anchorage in from 10 to 12 fathoms will have been reached, from whence the light-vessel at the entrance of Lynn channel bears S.W., distant 3 miles.

CAUTION.—As the bottom in Lynn Deep is irregular, and the tide-streams are rapid, a careful attention to clearing marks and bearings is absolutely essential, as well as a frequent use of the lead. Owing to a neglect of these precautions, vessels from the coast of Lincolnshire bound to Lynn have crossed the Deep, and become wrecked upon the shore of Norfolk. A depth of 9 fathoms leads outside Lynn Knock, when a S.W. course made good will insure the Well light-vessel being sighted.

It must also be borne in mind that the flood stream sets through the swashways into Boston Deep at the rate of 4½ knots at springs, and 2½ knots on neaps, from anywhere near Lynn Knock or the hook of Long sand. Also, from neglecting the bearing of Lynn Well light, while running up the Deep, several vessels have become wrecked upon the east side of the Roaring Middle.

TIDAL STREAMS.—The sets of the tide-streams in Lynn Deep are various. Between the Docking and Inner Dowsing the direction of the first of the flood is S.W., it then gradually draws towards W. by S. until high-water. Outside the Docking and Dowsing there are rotatory tides which never slack, and which run during springs at an average rate of 2½ knots per hour—first-quarter flood setting S.E., half-flood S.W., last-quarter flood and first-quarter ebb, West to N.N.W., and half-ebb to low-water, N.E. to E.S.E. Near the Woolpack and Sunk the flood sets W.S.W., and the ebb E.N.E.; while from the Sunk along the south-east side of the Deep, they are, respectively, S.W. and N.E. At Lynn Knock, and the hook of Long sand, the flood sets W. by S., and the ebb E. by N. In the body of the Deep above the Well light-vessel, the general sets are W.S.W. and E.N.E., and the farther to the westward the more westerly is the set; this is due to the in-draught through the swashways of Long sand before alluded to. The rise of the tide in the Deep, also, is so considerable, that caution is necessary to make due allowance for it while taking up an anchorage.

Directions for Lynn channel, and Lynn, are on page 130, and those for Wisbech channel, and Wisbech, are on pages 132, 133.

HEAD OF THE WASH.

LYNN CHANNEL leading to Lynn road, has the Roaring Middle and Whiting to the eastward, and Wisbech Middle and Westmark Knock to the westward.

BAR FLAT LIGHT-VESSEL.—A light-vessel, with the words *Bar Flat* on her sides, and carrying a globe at the mast-head, is moored in $3\frac{1}{2}$ fathoms at low-water spring tides, off the north-east end of Wisbech bar flat, west side of Lynn channel entrance; she exhibits at 38 feet above the sea a *fixed white* light.

Fog Signal.—During thick or foggy weather, a gun is fired and a gong is sounded.

From the light-vessel, Roaring Middle buoy bears E.N.E., distant $2\frac{2}{10}$ miles; Buoy, No. 1, E. $\frac{1}{4}$ S., $1\frac{1}{10}$ mile; Buoy, No. 2, S.E. by S., $\frac{8}{10}$ mile; Outer Gat buoy, N.W. $\frac{1}{2}$ N., $1\frac{1}{10}$ mile; and Lynn Well light-vessel, N.E. by E. $\frac{1}{2}$ E., 8 miles.

Buoys.—The buoys marking the Roaring Middle and Whiting have already been described on page 127. On the west side there is first the Bar buoy, a *red* can with staff and ball, S.W. by W. (westerly), $3\frac{6}{10}$ miles from the outer buoy of the Roaring Middle. The channel to Wisbech is on either side of this buoy, and then the eastern side of Westmark Knock up to Lynn road, is further defined at short intervals by *black* buoys.

Directions.—Lynn channel has from 8 to 5 fathoms in it; it is little more than one-quarter of a mile wide, and, with the exception of Wisbech bar buoy, has *black* buoys to the westward, and *black* and *white vertically striped* buoys to the eastward. The land within view is so low, and bare of available objects, that no marks can be given for navigating the channel, but the tide sets fairly through it, and the buoys are closely placed. Having arrived abreast the outer end of the Roaring Middle, the course will be S.W., changing gradually at the Whiting to S.W. $\frac{1}{4}$ S., S.S.W. $\frac{3}{4}$ W., and S. $\frac{3}{4}$ W.

CAUTION.—No vessel should enter Lynn channel at night, except under the guidance of a pilot; for, owing to not keeping near the edge of the Roaring Middle while working, several wrecks have taken place in the blind channel behind Wisbech Middle.

LYNN ROAD.—The best anchorage in Lynn road is from a short berth to the southward of the Whiting buoys to abreast the Thief and Hull beacons, in 3 fathoms, over mud, sand, and clay, in which the anchors hold well. This road is much exposed in northerly gales, but vessels then anchor in about the same depth at Lloyds Middle, from one to one and half mile farther up, where, though the space is limited, better shelter is afforded by the sands in gales from N.W. to E.N.E.

BULL-DOG CHANNEL.—One of the old outlets of the river Ouse has opened out at its inner end of late years, and is marked by *black*

and *white vertically striped* buoys to the eastward, and *black* buoys to the westward, in addition to several beacons. It is frequented by the small fishing vessels and coasters of the district, and is occasionally used by light vessels from Lynn, bound north in scant easterly winds, as it enables them to keep under the weather shore, and to clear the sands abreast Boston bar, when it could not be done by vessels passing out of Lynn channel. No marks for the Bull-Dog channel can be given, and no stranger should attempt to pass through it.

Pilots.—The pilot service of Lynn is performed by 13 pilots in a cutter, under the direction of a headsman. The vessel is always underway in Lynn channel after half-flood, but on other occasions she rides near the Roadstead buoy at the upper end of the Whiting. She carries a light during dark tides. The usual boarding place is near the Bell buoy,* but the pilots will proceed lower if required; the extra charge for so doing being moderate, and in proportion to the distance.

TIDES.—A spring tide which rises 23 feet 3 inches in Lynn road rises 22 feet 5 inches at Lynn; the wind, however, has a great effect upon the tides.

LYNN was in existence before the Conquest, and was named Lynn Regis, or King's Lynn, for its distinguished loyalty to King John. Seated upon the right bank of the Ouse, a little within its outfall, and 8 miles above Lynn road, it extends along the river for 1½ mile; a finely wooded country rises behind it in gentle eminences, and in front of it is a flat alluvial district. Owing to the low situation of the town, the two towers of St. Margaret's church, the spire of St. Nicholas, the old tower of Grey Friars monastery, and the tall chimney of a flax mill, are all that can be seen of it from the sea.

The outfall of the Ouse has undergone many remarkable changes. Originally it was on the Norfolk shore, occupying what is still termed the Old channel. In 1773, it shifted 1½ mile to the westward to the Bull-dog channel, where it remained until 1812, when it again moved 4 miles more westerly to its present position.

Considerable alteration has been made of late years in the channel of the Ouse below Lynn. In 1846, an Act was obtained for enclosing 32,000 acres of the Wash, and for substituting, in place of the tortuous river-course below the town, a straight cut 8 miles long, extending from Lynn across the marshes and through the sands down to Lynn road. Nearly 2½ miles of this cut has been executed, and an amended Act obtained in 1857 limits it to 4 miles in length. At the south end of it, near Lynn, the high and low water breadths are, respectively, 485 and

* This buoy does not carry a bell.

320 feet, which increase about 15 feet per mile towards the north or sea end. The depth in the cut at low-water ordinary springs is 7 to 18 feet.

The channel from Lynn road to the entrance is well beaconed, and marked by *black* buoys to the westward, and *black* and *white vertically striped* buoys to the eastward; but in consequence of its changeable character, the dearth of marks, and the cross-tide sets (particularly at the upper end), the aid of a pilot is indispensable.

Lights.—Two *white* leading lights are exhibited on the east side of, and about one mile from the lower end of, the cut, to enable vessels to enter at night, and those of light draught to proceed to the harbour.

Excellent moorings were laid down in Lynn harbour in 1841 for twenty tiers of vessels, with room for six vessels in each tier. At low-water there is a depth of 6 feet generally over the harbour, but several of the berths have 10 and 12 feet. In consequence of the light and shifting nature of the sand, vessels lie rather irregularly upon the ground for the first tide, and are often strained.

Dock.—The Alexandra dock, of 6¼ acres, at the north end of the town, was opened in 1869. The entrance lock is 192 feet long between the gates, and 50 feet wide, with a depth of 2 feet 3 inches over the sill at low-water of spring tides.

Vessels of 18 feet draught can reach the town during springs, and those of 14 feet at neap tides. With a foul wind, vessels bound to Lynn weigh from the road at quarter-flood, and with a fair wind at half-flood.

Prior to the opening of the Eau brink cut in 1821, the alluvial soi deposited in front of the granaries on the east side of the harbour formed a natural quay, which has been extended and piled, and is 1,041 feet in length, by 26 feet in width. There is a powerful crane, and two steam machines for discharging colliers; tramways are laid along these quays communicating immediately with the Great Eastern and other railways.

The chief trade of Lynn is in oil cake and Baltic produce, and corn and coal coastwise; it is at times very considerable, owing to the port having a ready communication with eight contiguous counties; there is also a large export of coprolites. The jurisdiction of its custom-house extends to Brancaster on the Norfolk coast, and to Sutton sluice on the Lincolnshire shore. There are two building-yards, a dry dock, and two patent slips, but ship-building is not carried on to any material extent.

In 1880, the arrivals were 1,204 vessels of 193,223 tons.

The population of Lynn in 1881 was 18,475.

Supplies for shipping are plentiful, and water may be obtained at the Marine parade, and at many other places.

WISBECH CHANNEL leaves Lynn channel at the Bar buoy,

a *red* can with staff and ball. It is formed between Wisbech Middle on the west or starboard hand, and Westmark Knock on the east or port hand, which sands dry at low-water. The Bar buoy bears S.W. by W. (westerly), distant $3\frac{6}{10}$ miles from the outer buoy of the Roaring Middle; and S.W., $1\frac{1}{2}$ mile from Bar flat light-vessel, and may be passed on either hand. The channel up to the anchorage in Wisbech road, is marked by seven *red* buoys and Bachelor beacon along the Middle and adjoining flat, and by *red* and *white vertically striped* buoys upon the western side of Westmark Knock. There is also a life-beacon upon the latter sand, one and a quarter mile W. by S. $\frac{1}{2}$ S. from the Bar buoy. From the road to the embankments of the cut, the channel, which is subject to change, is marked for some distance by *red*, and *red* and *white vertically striped* buoys, and then by basket and brush beacons. The channel is lighted during dark tides in winter.

There is a depth of only 9 feet at low-water into Wisbech channel, but within the bar it quickly increases to 3 and 4 fathoms, and the buoys on either side the channel will be sufficient guide up to the road, 2 miles above the bar. A berth should be taken up in the deep water near the third *red* and *white* buoy, in from 7 to 9 fathoms.

Pilots.—There are six Wisbech pilots under a master; they board at the road; but pilotage is not compulsory, and the consequence is that they meet with little encouragement.

WISBECH, or Wisbeach, is on the river Nene, 12 miles above its outlet, and 16 miles above Wisbech road. The town, which is ancient, and the largest in the Isle of Ely, stands upon both banks of the river, which formerly was here crossed by a stone bridge built in 1760. This bridge acted as a serious obstruction to the flow of the tide, and to the discharge of the land waters, and an iron bridge has been substituted; it was opened for traffic on the 9th of November 1857.

As late as 1827, vessels of 60 tons only could reach the town with the best spring tide, and the arrival of a vessel of 100 tons was a cause of rejoicing; but in that year an Act was obtained for improving the outfall of the Nene, the town contributing 30,000*l.* towards the expense. Between 1827 and 1830 the greater part of the navigation from Wisbech to the sea was improved, straightened, and deepened, and a new cut was made so as to avoid the old and uncertain channel through Cross-keys Wash. Extensive works, consisting of new wharfing, have also been executed in the town.

The Midland Railway Company has a coal-drop at Wisbech, in connection with the river; and there is also a branch line of the Great Eastern Railway.

Sutton Bridge.—Three miles above the outfall, the navigation is crossed by Sutton bridge. The original bridge was built on piles, with a central waterway 45 feet broad; but stones which were thrown down to defend the bridge, caused eddies and deep holes that rendered the passage through it somewhat difficult; the bridge was, besides, a serious obstruction to the stream, for the fall which it occasioned at half-ebb amounted to 3 feet in a distance of 100 yards. In 1849–50 a revolving iron bridge, with two openings, each of 60 feet width, was erected close to the old bridge, which with its bank of stones was taken away. There is a line of quays below the bridge on the west side, at which the heaviest vessels using the port sometimes discharge. The general width of the cut above and below the bridge is 120 feet, and the former points of the outlet are marked by two beacon towers.

Sutton Bridge Dock.—A dock is now (1881) in course of construction on the west side of the Nene about 2½ miles above the towers at the entrance of the river. The dock is 1,415 feet long, 400 feet wide, and has an area of 13 acres; the entrance to it is 50 feet in width, and the depth of water over the sill at high-water ordinary springs is 24 feet, and at low-water about 5 feet. The average depth of water in the dock will be 20 feet.

Works, under the direction of the Commissioners of the Nene outfall, are in progress for straightening and improving those parts of the channel not under the operation of the Act passed in 1827. Deep laden vessels of 200 to 300 tons can now get up to the town of Wisbech. Vessels usually tow up from the road. The navigation is free of shoals.

Corn is exported, as well as coals, hay and straw, salt, and coprolites. The imports are timber, cake, coal, seeds, and grain. Some minor manufactures are carried on; there is one yard for repairing vessels and building small river craft, and a patent slip. 26 vessels of 4,715 tons belonged to the port on the 1st January 1881. In 1880 the arrivals were 727 vessels of 65,151 tons. The population in 1881 amounted to 9,248.

TIDES.—The tide is rapid during springs, but with freshes, the neap flood sometimes does not reach the town. Common springs rise 20 feet 6 inches at Sutton bridge, and 15 feet 2 inches at Wisbech. The flood-stream runs for 4 hours at Sutton bridge, and for 3 hours at Wisbech.

BOSTON GAT, or South channel, so named in contradistinction to the North channel, or Boston Deep, described on pages 121–123, is formed by Gat sand to the southward, and the Roger to the northward; its entrance bearing W. ¾ N., distant 3 miles from Roaring Middle outer buoy, and N. ¾ E., 2¼ miles from Wisbech bar buoy. This passage, tortuous

and subject to frequent change, is used only by small vessels from Lynn or Wisbech bound to Boston, or by those taking the inner passage along the shore of Norfolk and through the Bays.

Boston South channel is steep-to on both sides, and for the most part only one-quarter of a mile wide. At the entrance, the depths are 16 and 17 feet at low-water, but quickly increase to 4 and 5 fathoms within the bar. This channel is marked by two *black* and *white vertically striped* buoys, Outer and Inner Gat, and by Gat beacon on the port hand; and on the starboard side, by the Roger *black* buoy at the entrance, and Toft beacon at the western end of the Roger.

Directions.—Having arrived midway between the Roger and Outer Gat buoys, the course is W. $\frac{3}{4}$ N. for $\frac{3}{4}$ mile to abreast the Inner Gat buoy, then steer W.N.W. (northerly) for $1\frac{1}{4}$ mile, in mid-channel, and having passed 2 cables to the northward of Gat beacon, a W. $\frac{1}{2}$ N. course for $1\frac{1}{2}$ mile will take to abreast Toft beacon, beyond which the channel divides, one branch turning to the northward into Boston Deep, the other, trending to the south-west and then to the westward, joins the main stream of the Witham. Both passages are crooked and shallow, and, though buoyed out, are too intricate to be used by a stranger. Such, therefore, having arrived at Toft beacon, should, if bound to Boston, hoist the usual pilot signal; but if bound to Fossdyke bridge, or Spalding, the pilot jack below a burgee at the fore-topmast-head is the signal for a pilot.

BOSTON is seated on both banks of the river Witham, 5 miles above its junction with the Welland in Fossdyke Wash. This town was equal in commercial importance to the metropolis itself in the thirteenth century, but a succession of fires and inundations caused its prosperity to decline from the end of the fifteenth century, and now its trade is of minor importance.

Boston parish church, erected in 1309, is dedicated to St. Botolph; its elegant and lofty tower is a well-known object to seamen, among whom it has obtained the rather questionable appellation of "Boston stump." It is of the perpendicular style, and surmounted by an octagonal lantern, which would seem to have been designed for a beacon light; the total height from the ground is 263 feet, and it may commonly be seen in clear weather at the distance of about 25 miles.

In the middle of the eighteenth century, the river and haven had fallen into a ruinous state through neglect; in 1720, a vessel of 250 tons could get up to Boston, but thirty years later vessels of 40 and 50 tons could with difficulty reach it at the top of spring tides; this deterioration is said to have been caused by a diversion of the Fen waters from the Witham. Important improvements have, however, been carried out of late years; the

watercourse has been judiciously narrowed; several awkward bends have been cut across, thereby straightening the river from Skirbeck to Hob Hole, and the sides defended by faggot work, leaving an average width of 220 feet; the channel is besides well lighted from the town to the Scalp. Before these improvements were begun, sloops drawing 6 feet could reach the town only during springs; now 12 feet is a common draught.

The river is crossed at the town by a fixed iron bridge, with an arch of 86 feet span, and a little above it by a sluice. This barrier, named the Grand sluice, by preventing the ingress of the tidal water into the upper section of the Witham, converts the lower portion of the river into a mere inlet, in which rapid deposition of the lighter particles of sea sand, to the extent of several feet, takes place in dry seasons, to be again removed by the first long continued flood. There are two quays at Boston, but vessels mostly secure to stages below the town, where they load from or discharge into river craft.* The Witham and various canals connect Boston with Lincoln, Gainsborough, Nottingham, and Derby.

Its chief trade consists of imports of coal and general cargoes, and an export of grain.

There is a building-yard, and also a patent slip, and a gridiron. Forty to fifty years ago large vessels were built here, but now those constructed seldom exceed 100 tons burden.

Boston is connected with the Great Northern Railway; and with Hull, London, and Wisbech, by steamer. 66 vessels of 3,513 tons belonged to the port 1st January 1881. The arrivals in 1880 were 471 vessels of 35,651 tons. Population, 14,932 in 1881.

Supplies.—General supplies are plentiful; water of good quality has been led down from Keal hill, 12 miles distant, and the charge for it is moderate.

Pilots.—There are six Boston pilots; their vessel is moored in Clay Hole, and pilotage is compulsory.

Owing to the narrowness of the cut, a steam tug is usually employed, but vessels can sail either way with the wind from W.S.W. and E.N.E.

TIDES.—Spring tides rise 23 feet 4 inches at Clay Hole, and 13 feet 2 inches at Boston black sluice; neaps range 9 feet 2 inches at Clay Hole, and 6 feet at Boston black sluice.

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* Works are now (1881) in progress for the improvement of the river below Boston; these include the deepening of the present channel, and the formation of a more direct channel about 3 miles in length. The Harbour Commissioners have also obtained an Act empowering them to construct a dock just below the town. The dock is to be about 7 acres in extent, with a depth of 25 feet over the sill at high-water of spring tides, and it is to be connected with the Great Northern Railway by a swing-bridge across the river.

SPALDING is upon the river Welland, 12 miles above its junction with the Witham.

The navigation of the Welland is still very defective, particularly at the Reservoir, where a double elbow somewhat interferes with the passage of the tide. During the summer the river is also much encumbered with deposit brought in by the flood, and the width, which averages 120 feet from Fossdyke bridge to the Reservoir, decreases to 60 or 70 feet from thence to Spalding. Vessels of 7 feet draught reach Spalding at spring tides, and they are towed up by horses.

Vessels of burden discharge at Fossdyke bridge, which crosses the Welland 8 miles below the town; it is built on piles, and has a waterway of 28 feet. As late as 1835, vessels drawing 6 feet could with difficulty reach the bridge on spring tides, but since that time a plan of improvement has been acted upon; the outfall of the Welland, marked on either side by basket and brush beacons, has been carried, by a system of faggot work, in a straight direction through the Wash, and now vessels drawing 12 feet reach the bridge during spring tides, and those of 6 feet at neaps.

Spalding is a creek to Boston custom-house. The arrivals at Spalding and Fossdyke bridge in 1880 were 70 vessels of 3,025 tons. Population, 9,260 in 1881.

Pilots.—A pilot-vessel lies in the mouth of the Outfall, 4 miles below Fossdyke bridge; there are two pilots, but pilotage is not compulsory The channel is well lighted in the winter season.

The following shoals lying in the eastern approach to Lynn Deep, are in the offing abreast the coast of Norfolk, and to the eastward of the Docking.

DUDGEON is a very dangerous bank lying nearly in the direct track of the eastern coast trade between Flamborough head and Cromer. It is $2\frac{1}{2}$ miles long in a N.N.W. $\frac{1}{2}$ W. and S.S.E. $\frac{1}{2}$ E. direction, and one mile broad; the depths upon it varying from 9 feet to 4 fathoms, and it has 8 and 9 fathoms about it.

DUDGEON LIGHT-VESSEL.—The Dudgeon is marked by a light-vessel moored in $10\frac{1}{2}$ fathoms, S.W., rather more than one mile from the shoalest spot; the light, which is shown at 35 feet above the water, is *white, fixed,** and visible at the distance of 10 miles in clear weather.

* The Trinity House, London, has given notice that it is intended in the spring of 1882 to make the Dudgeon light a *double flashing* light, *one white flash* and *one red flash* following each other in quick succession *every half minute*. The red flash will be as nearly as possible equal in power with the white flash, and the approximate proportions of time will be—white flash *two and half seconds*, darkness *two and half seconds*, red flash *two and half seconds*, darkness *twenty-two and half seconds*. 28th December, 1881.

Fog Signal.—A gong is sounded in thick or foggy weather.*

From the Dudgeon light-vessel, Cromer lighthouse bears S. by E. $\frac{1}{8}$ E., distant nearly 24 miles; Spurn high lighthouse, N.W. $\frac{3}{4}$ N., $35\frac{1}{2}$ miles; Flamborough head lighthouse, N. by W. $\frac{1}{4}$ W., 63 miles; Hasborough light-vessel, S.E. $\frac{7}{8}$ S., $29\frac{1}{2}$ miles; East Sherringham buoy, S. by E. $\frac{3}{4}$ E., $16\frac{3}{4}$ miles; South Race buoy, S.S.W. $\frac{1}{4}$ W., $6\frac{1}{4}$ miles; North Race buoy, W. by N. $\frac{3}{4}$ N., $7\frac{2}{10}$ miles; North Inner Dowsing buoy, N.W. by W. (westerly), $14\frac{1}{10}$ miles; Outer Dowsing light-vessel, N.E. $\frac{3}{4}$ N., 14 miles; and Inner Dowsing light-vessel, N.W. $\frac{1}{2}$ W., $13\frac{8}{10}$ miles.

Buoy.—A can buoy, *striped black* and *white vertically*, lies in 5 fathoms, upon the south-west side of the shoalest part of the Dudgeon, with the light-vessel bearing S.W. by W., distant one mile.

North Ridges, though separated from the Dudgeon by a narrow 5-fathoms channel, may be considered as a north-west continuation of that shoal; they consist of several parallel ridges lying in a north-west and south-east direction with 3 fathoms upon them, and having deep water between them; their north-west extremity is N.N.W. $\frac{1}{4}$ W., 4 miles from Dudgeon light-vessel. Three miles north-westward of the North Ridges are several other patches with only 3 and 5 fathoms over them. All these obstructions are much in the way of vessels of heavy draught.

The light-vessel kept to the eastward of S.S.E. $\frac{3}{4}$ E. will clear the North Ridges, but about low-water it is a safer course to pass to the eastward of the Dudgeon, giving the light-vessel a berth of 3 or 4 miles.

RACE BANK, to the south-westward of, and abreast, the Dudgeon, is separated from it by a channel 4 miles wide. From the south end, the direction of the shoal is first N. $\frac{3}{4}$ W., for 3 miles, and then N.W. $\frac{3}{4}$ N., for $4\frac{1}{2}$ miles. It is very narrow, and the shoalest spot (9 feet) is $1\frac{3}{4}$ mile from the south tail, but 2 and 3 fathoms are the general depths upon it. There is a depth of 7 fathoms close to the eastward, 10 fathoms to the westward, and 8 and 10 fathoms between it and the Dudgeon.

BUOYS.—Race bank is marked by a buoy at each extremity.

North Race buoy is conical, *striped red* and *white horizontally*, and lies in 8 fathoms; with Dudgeon light-vessel, bearing E. by S. $\frac{3}{4}$ S., distant $7\frac{2}{10}$ miles; south buoy, S.S.E. $\frac{1}{3}$ E., $8\frac{9}{10}$ miles; and Inner Dowsing light-vessel, N.W. by N., 8 miles.

South Race buoy is cylindrical, *striped red* and *white horizontally*, and lies in 5 fathoms; with a gap in the trees on the high back land, open south of Brancaster mill, S.W. by W. $\frac{2}{3}$ W.; Dudgeon light-vessel, N.N.E. $\frac{1}{4}$ E., $6\frac{1}{4}$ miles; Cromer lighthouse, S.S.E. $\frac{1}{2}$ E., $19\frac{1}{4}$ miles; East Sherringham buoy, S.E. $\frac{1}{3}$ S., $13\frac{2}{10}$ miles; Burnham flats buoy,

* *See* Regulations respecting light-vessels, footnote, page 101.

W. by N. $\frac{3}{4}$ N., $10\frac{8}{10}$ miles; Docking buoy, N.W. $\frac{3}{8}$ N., 10 miles; and Blakeney church, S. $\frac{1}{4}$ W., $12\frac{1}{4}$ miles.

There are two small ridges with 3 and 4 fathoms upon them one mile to the eastward of the north-west end of Race bank.

OUTER DOWSING is the last shoal to be described in this section; within a depth of 10 fathoms it is 22 miles long S. by E. $\frac{1}{4}$ E. and N. by W. $\frac{1}{4}$ W., and is 3 miles wide at its centre or broadest part; there are two 2-fathoms patches on the body of the shoal, from the northern of which, marked by the light-vessel, Dudgeon light-vessel bears S.W. $\frac{1}{4}$ S., distant $13\frac{1}{2}$ miles; and Cromer lighthouse, S. $\frac{1}{2}$ W., $32\frac{3}{4}$ miles; other patches with 3 to $4\frac{1}{2}$ fathoms upon them are to be found nearly throughout the shoal. There are depths of 11 and 12 fathoms close to the eastward and westward.

OUTER DOWSING LIGHT-VESSEL is moored on the west side of the shoal in $10\frac{1}{2}$ fathoms at low-water; the light *revolves quickly*, showing a *red* face *every twenty seconds*, at 36 feet above the sea, and is visible at the distance of 10 miles in clear weather. In order to render this vessel more readily distinguishable in the day from the other light-vessels in the vicinity, she carries a half-globe above the usual globe.

Fog Signal.—In thick or foggy weather, a horn gives blasts of *five seconds* duration, with an interval of *two minutes* between each blast.*

From the light-vessel, Outer Dowsing buoy bears N. $\frac{1}{4}$ W., distant $4\frac{1}{2}$ miles; Spurn high lighthouse, N.W. by W. $\frac{1}{4}$ W., 34 miles; Dudgeon light-vessel, S.W. $\frac{3}{4}$ S., 14 miles; Cromer lighthouse, S. $\frac{1}{4}$ W., 34 miles; north extreme of the shoal (5 fathoms) N. $\frac{3}{4}$ W., $5\frac{1}{2}$ miles; and the nearest shoal spot, E. by N., one mile.

Buoys.—A large conical buoy, *striped horizontally black* and *white*, carrying a staff and diamond, and marked Outer Dowsing North end, lies towards the north end of the shoal, in 6 fathoms water, about 2 cables westward of a patch of 4 fathoms, and N. $\frac{1}{4}$ W., $4\frac{1}{2}$ miles from the light-vessel.

A *chequered black* and *white* can watch buoy, marked Outer Dowsing, is E. by S. $\frac{3}{4}$ S., $\frac{3}{4}$ mile from the vessel.

There are several other shoals, as the Haddock, and Cromer Outer and Inner banks, all lying to the eastward of the Outer Dowsing.

TIDAL STREAMS.—In the neighbourhood of Dudgeon light-vessel the rotatory action of the tide is remarkable. At 12 o'clock, or low-water by the ground, the stream sets N.N.W., and continues to run strongly in that direction till 2 o'clock, it then veers to the westward; at

*See Regulations respecting light-vessels, footnote, page 101.

3 it sets West, and then gradually changes to S.W., S.S.W., and South, until past 6, or high-water by the ground, when it sets S. by E. and S.S.E. till a quarter past 8, after which its direction is progressively to S.E., East, N.E., and N.N.E., until 11 o'clock, and so continues to low-water.

Between the Docking and Race bank, the direction of the stream is the same as at the Dudgeon.

Directions.—Vessels of draught bound to Lynn Deep, the Humber, or Flamborough head, usually take a departure from the Dudgeon. Having passed Cromer, a N. ¼ W. course for 7 miles will clear Sherringham shoal, and then N.N.W. ½ W. for 17 miles, leads to Dudgeon light-vessel. In both cases due allowance must be made for the tide-stream. Then, if bound into Lynn Deep, steer W. by N. ¾ N., for 7 miles, to the north buoy on Race bank, and a further course of W. ¼ N., for 2¼ miles, to the buoy on Docking shoal. From one mile to the westward of the latter buoy, a S.W. ¾ W. course for 15 miles will lead between Burnham ridge and Lynn Knock to Lynn Well light-vessel. The directions for the Deep will be found at pages 128–130.

The following is a description of the coast, harbours, and outlying dangers, with directions for the navigation, between Cromer and Hunstanton point.



Cromer church, S.S.E. ¼ E., 2 miles.

CROMER, frequently termed "Foulness," from the rugged nature of the bottom in front of it, is at the north-east extremity of the county of Norfolk. This is a headland well known to seamen, being a common point of arrival and departure in the passage across the Deeps. Its mud cliffs (as they are termed) are high and bold, being steep to the northward, and sloping gradually to the southward; from the nature of their composition, and the joint action of land-springs and the sea, extensive landslips frequently occur.

LIGHT.—The prominent position of Cromer early pointed it out as an important light station. A coal fire, and subsequently a light, was displayed from a tower erected upon the cliff in 1719; but the sea making great inroads in its vicinity, another lighthouse was built in 1832 on a higher eminence in the rear. The old light-tower was a prominent

object near the brink of the cliff until it was overthrown by the sea in December 1866.

The present light is *white*, it *revolves every minute*, is placed at 274 feet above high-water, and may be seen in clear weather at the distance of 23 miles. From it, Foulness buoy bears N.E. by E. $\frac{1}{2}$ E., distant $1\frac{7}{10}$ mile; East Sherringham buoy, N. $\frac{1}{4}$ W., 7 miles; Hasborough light-vessel, E. $\frac{2}{3}$ S., $10\frac{9}{10}$ miles; Dudgeon light-vessel, N. by W. $\frac{1}{3}$ W., nearly 24 miles; and Flamborough head lighthouse, N. by W. $\frac{1}{4}$ W., 87 miles.

FOULNESS ROCKS.—The bottom in front of Cromer lighthouse is an extension of a bed of chalk underlying the mud cliffs; it is very uneven, and causes a high sea in gales.

Buoy.—A 9-feet *black* conical buoy, marked Foulness Rock, lies in $6\frac{1}{2}$ fathoms at the outer extremity of the foul ground; with Cromer lighthouse bearing S.W. by W. $\frac{1}{2}$ W., distant $1\frac{7}{10}$ mile; Hasborough high lighthouse, its full length westward of Hasborough church, S.S.E. easterly; and East Sherringham buoy, N. by W. $\frac{1}{2}$ W., $6\frac{8}{10}$ miles. At night, go no nearer to it than into a depth of 8 or 9 fathoms.

Cromer town is on the brink of a cliff 30 or 40 feet high, three-quarters of a mile to the north-westward of the lighthouse; the cliff rises steeply on either side, and the country behind is bold and well wooded. This place, anciently called Shipden, was of considerable extent and importance, but half of the town, including one of its churches, has been swept away by the sea. The remaining church is the principal object; it has an embattled tower 160 feet high, and a small disproportioned nave, with the west entrance and chancel in ruin. That part of the town which faces the sea consists of respectable lodging and dwelling-houses, the bank on which they stand being protected from inroads of the sea by extensive barriers and groynes. There is also a pile jetty on the sands in front for the accommodation of visitors. Population, 1,423 in 1871.

Cromer possesses no harbour, and colliers discharge their cargoes on the beach.

A Life-Boat, and apparatus for saving life, are maintained here.

TIDES.—It is high-water, full and change, at Cromer, at 7h.; springs rise $14\frac{3}{4}$ feet, neaps rise 11 feet, and range $7\frac{1}{2}$ feet. Four miles off Cromer, the flood stream runs to the S.S.E. until 10h. 15m., or 1h. 50m. before high-water at Harwich, and the ebb in an opposite direction.

The COAST.—Cliff of considerable height, with several dips in it, extends from Cromer to Sherringham, and rocks stretch out from the foot to the distance of one cable; the background is elevated, and covered by

wood. The pretty village of East Runton stands partly in the rear and on the face of the cliff, down which a score or roadway has been cut. Runton and Beeston churches are both distinct objects from the sea, but little of either village can be seen. One mile to the westward of Beeston is a high bold cliff, with a rounded eminence a little in the rear.

LOWER SHERRINGHAM, a fishing village of red-tiled houses, is in a saddle or hollow, a little to the westward of the cliff just described; there is generally a large number of boats lying on the beach in front. The village of Upper Sherringham, with a mill on the outline, appears above it in the background.

A Life-Boat, rockets, &c. are stationed at Sherringham.

SHERRINGHAM SHOAL, in the offing abreast the village from which it takes its name, is $4\frac{1}{4}$ miles long in a N.W. $\frac{3}{4}$ W. and S.E. $\frac{3}{4}$ E. direction, and one-quarter of a mile broad, with 2 and 3 fathoms upon it; it is steep-to, there being 10 fathoms within a short distance on both sides.

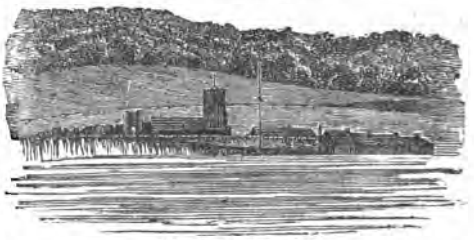
BUOYS.—East Sherringham, at the south-east end of the shoal, is a cylindrical buoy, *striped horizontally black* and *white*, lying in 5 fathoms; with the east end of a grove of trees on the highland, in line with Runton mill, bearing S. $\frac{2}{3}$ W.; and a mill on the back land, one quarter of the distance from Blakeney mill towards Blakeney church, W. by S.; South Race buoy, N.W. $\frac{1}{3}$ N., distant $13\frac{2}{10}$ miles; Hasborough light-vessel, S.E. $\frac{2}{3}$ E., 14 miles; Foulness rocks buoy, S. by E. $\frac{1}{2}$ E., $6\frac{8}{10}$ miles; and Blakeney overfalls buoy, N.W. by W. $\frac{3}{4}$ W., $8\frac{1}{2}$ miles; Cromer lighthouse, S. $\frac{1}{4}$ E., 7 miles; Dudgeon light-vessel, N. by W. $\frac{3}{4}$ W., $16\frac{3}{4}$ miles; and the village of Lower Sherringham, S.W. by S., $5\frac{1}{2}$ miles. A clear channel $3\frac{1}{2}$ miles wide, with 6 to 10 fathoms depth over a bottom of shells, sand, and stones, separates the shoal from the Pollard.

West Sherringham, at the north-west end of the shoal, is a conical buoy, *striped horizontally black* and *white*, in $4\frac{1}{2}$ fathoms; with Weybourn windmill, midway between the east end of a wood and a conspicuous roadway, bearing S. by W. $\frac{1}{3}$ W.; Blakeney church tower, three times its length westward of the bluff end of a wood, S.W. $\frac{2}{3}$ W.; Foulness buoy, S.E. by S., distant $10\frac{3}{4}$ miles; East Sherringham buoy, S.E. by E. (easterly), $4\frac{3}{10}$ miles; Dudgeon light-vessel, N. $\frac{3}{4}$ W., $13\frac{2}{3}$ miles; South Race buoy, N.W. by N. (northerly), $9\frac{2}{10}$ miles; Blakeney overfalls buoy, W. by N. $\frac{2}{3}$ N., $4\frac{1}{2}$ miles; and Cromer lighthouse, S.S.E., (easterly), $10\frac{2}{10}$ miles.

To pass outside Sherringham shoal, keep Cromer lighthouse bearing to the westward of S. $\frac{1}{4}$ W., until Blakeney church has been brought to the southward of W. by S. $\frac{1}{4}$ S., when a course may be shaped for the Dudgeon.

The COAST.—Half a mile to the westward of Lower Sherringham the cliff is again high, continuing with a gradual fall to Weybourn, where it ends ; the back land in this district is high and well wooded.

WEYBOURN.—Weybourn church, with some ruins attached to it, is hid by the cliff on most points of bearing, and the village does not appear whilst it is to the westward of S.W. A tower windmill upon high ground half a mile to the south-eastward, and the black coast-guard houses on the beach at the west fall of the cliff, are, however, very prominent.



Weybourn church.

Telegraph cables extend from Weybourn to Emden, Heligoland, and Tonning.

Rockets, &c., are kept at Weybourn, and Cley, for effecting communication with stranded vessels.

To the westward of Weybourn the back ground is high ; Kelling church is upon the outline surrounded by wood, and the village of Salthouse with its church and windmill, is seen below it to the northward. These two churches are used as a clearing mark for Blakeney Overfalls (*see* page 146).

POLLARD SHOAL lies abreast Salthouse ; it is 2 miles long in a W.N.W. and E.S.E. direction, and three-quarters of a mile broad, with $2\frac{1}{2}$ fathoms over it. The channel between it and the shore is one mile wide. Kelling and Salthouse churches in line, bearing S. by E., leads one mile to the westward of the Pollard.

Beyond Salthouse, the back land decreases in height, and a shingle beach occupies the foreground from Weybourn to Blakeney harbour.

Cley and Blakeney are not prominent from the sea, the former having much wood about it, and the situation of both being low. Blakeney church (*see* view on chart, No. 1455) is, however, a very conspicuous object from every part of the coast between Cromer and Hunstanton, and in clear weather it may be seen from the Dudgeon. It has a lofty tower, and a turret at the north-east angle of the chancel, supposed to have been used as a lighthouse in early times.

BLAKENEY HARBOUR.—The entrance to Blakeney harbour, 12 miles to the westward of Cromer, and S. by W. $\frac{1}{3}$ W., 16 miles from Dudgeon light-vessel, is well marked by the Hood, a sand-hill one mile to the eastward, remarkable as being higher than any of the sand-hills about

it. The harbour is formed by the Ler, a salt-water inlet or creek, which runs in a south-westerly direction for half a mile, and then turns abruptly to the south-eastward. Abreast Blakeney it divides; one branch running to that place, and the other to Cley, where it takes the name of the Glaven.

The prosperity of Blakeney as well as of Cley has declined of late years, owing to the deterioration of the harbour which followed the enclosure of 12,000 acres of marsh lands. Sixty years ago, vessels drawing 9 feet could reach Cley; now, 5 feet is the greatest draught seen there, and the channel is, besides, too narrow to allow of a vessel swinging.

A Life-Boat is stationed at Blakeney.

Blakeney is a creek under the custom-house of Lynn. The common export is grain, and the imports are timber, salt, coals, manures, and general goods. Of the vessels belonging to the port, 12 are engaged in the neighbouring oyster fishery. Population, 817 in 1871.

A steam tug is employed here; the signal for her being a burgee at the main.

Buoys.—At the fairway of the entrance to the harbour is a *red* buoy, marked Blakeney Fairway, lying in 27 feet water, and the channel is marked for the first half-mile by *black* buoys to the westward and *white* buoys to the eastward;* the two outermost buoys on each side carry beacons. The channel above the lower point is termed the Pit; here vessels taking refuge, and those bound seaward, are commonly berthed. From the Pit to the town of Blakeney, the channel is marked by floating logs and small beacons.

A swashway to the westward of the principal entrance, named the West Low, is, when navigable, a useful passage to vessels of light draught in scant westerly winds, and it is then marked by a *chequered black* and *white* buoy in its fairway, and by two *red* buoys, which must be left on the starboard hand in entering, while two lozenge-shaped beacons upon the lower point lead through it. At the present time (1881) it is not open.

Blakeney Bar (a shifting one) is generally awash at low-water springs, and the direction and state of the channel are greatly affected by prevailing winds, those from N.E. and E.N.E. having an unfavourable effect, while westerly winds are beneficial, but the buoys are shifted upon any change occurring.

Pilots and Signals.—Pilots may always be obtained in moderate weather, but a vessel forced to run into Blakeney harbour without one

* This arrangement as to colour is observed in the buoyage of most of the small harbours on this coast.



Pilots Look-out house and flagstaff.

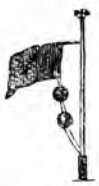
must pay attention to the flags, that, under such circumstances, are waved by the pilots on the lower point. When in safety, vessels may be berthed in any direction, as the bottom is soft.

The following signals indicating the depth, are also hoisted on the watch-house flagstaff near the entrance. In making them, the pilots take into consideration the lift of sea at the time.

Red.



8 feet.



10 feet.



12 feet.



West Low

CAUTION.—When no signal is hoisted, the harbour should not be attempted, or, if one be shown for a moment and then hauled down, it is intended as a warning to that effect.

Directions.—Blakeney church bearing S.S.E. ¼ E. leads to the fairway buoy, and vessels of 14 and 15 feet draught can commonly enter the harbour during springs. In entering, keep close to the black buoys in westerly winds, and to the white buoys if the wind be easterly. It is necessary also to guard against the stream of flood, which, at the last-quarter, sets strongly to the eastward across the channel, but this ceases to be felt as the lower point is closed. The entrance can generally be sailed with the wind from N.N.W., round easterly, to S.S.E.

TIDES.—Between Cromer and Blakeney, it is high-water, full and change, by the shore, at 6h. 30m., and as far as Wells, the flood-stream runs to the south-eastward until 3 hours after high-water. Springs rise 15 feet at Blakeney bar, 9 feet at Blakeney, and 5½ feet at Cley; during neaps the rise is 3½ feet less at Blakeney and Cley. The stream runs 5 hours to the north-westward, and 7 hours to the south-eastward.

BLAKENEY KNOCK and OVERFALLS are the outermost of several shoal water ridges projecting from Burnham flats to the eastward in a direction parallel to the shore. They are abreast of, and three miles from, Blakeney harbour; they have 11 and 8 feet upon them, and 3 fathoms between them. The depths outside them are from 7 to 9 fathoms, and inside 5 to 9 fathoms.

Buoy.—A *black* bell buoy, with staff and globe, lies in 6½ fathoms at low-water springs, three-quarters of a mile to the eastward of a depth of

3 fathoms upon their eastern end; with Blakeney mill, open westward of the bluff west end of a wood, and midway between it and the chancel turret of Blakeney church, bearing S. by W. ¼ W.; Kelling church, open eastward of Salthouse church, S. ¾ E.; and Wells tower-mill, open eastward of a white house near the beach, W.S.W.; Burnham flats buoy, N.W. ½ W., distant $15\frac{3}{10}$ miles; Bridgirdle buoy, W. by N., $10\frac{1}{10}$ miles; Docking buoy, N.N.W. ¼ W., $16\frac{1}{10}$ miles; South Race buoy, N. ¾ W., 6½ miles; East Sherringham buoy, S.E. by E. ¾ E., 8½ miles; Foulness rocks buoy, S.E., 14 miles; and Cromer lighthouse, S.E. ¾ S., $13\frac{4}{10}$ miles.

Blakeney church, bearing S.S.W., clears the east end of the Overfalls in 6 fathoms; Holkham monument and black boat-house in line, W. by S., leads to the south-eastward in 5 fathoms; and Kelling and Salthouse churches in line, S. by E., leads to the westward of the bell buoy in 3½ fathoms.



Kelling and Salthouse churches nearly in line, S. by E.

STIFFKEY, or STUKEY OVERFALLS, is another ridge of the same character as Blakeney overfalls, lying in front of, and about 1½ mile from, the entrance of Wells harbour; 8 feet is the least water upon it; within it, there are 4 and 5 fathoms; and outside 4 to 7 fathoms.

The COAST.—From Blakeney to Wells the coast is low and sandy, with a sand-hill or "meal" occurring here and there, and is fronted by a shoal shelf. The background is well wooded, and the chief objects upon it are Morston and Stiffkey churches, and a few windmills. Care must be observed while standing to the westward in the vicinity of Wells, as the sand at low-water dries out from the coast for more than one mile.

WELLS, 6 miles to the westward of Blakeney, stands low, being little above the level of the marshes; the houses are mostly built of red brick and tiled, and the church with a plain square tower, and east and west windmills, the latter the highest, are its chief objects. The town is fronted by a substantial stone quay.

Wells has a custom-house with a district extending from Sandhole gap, between Sherringham and Weybourn, to Brancaster. The trade, including Burnham and Brancaster, consists of the export of grain and malt, and the

importation of oilseed cake, coal, and general goods. The arrivals in 1880 were 328 vessels of 16,268 tons. Population, 2,647 in 1881.

A Life-Boat is stationed at Wells.

Wells Harbour is formed by a salt-water creek. Entering a flat foreshore of shingle and sand it passes between two ridges of sand-hills, and then through the marshes up to the town, having an irregular course nearly three miles in length; it then turns easterly, sending off several branches into the marshes. Many alterations have been made in the channel of late years; dams have been placed across the mouths of the eastern creeks or fleets, to cause the whole force of flood and ebb to pass the quay at Wells, and a straight embankment has been carried from Wells to the western sand-hills for the reclamation of Holkham marshes. This harbour, like that at Blakeney, has been much injured by the embankment of marsh lands.

Beacons.—One mile below the town are extensive ridges of sand-hills, called Holkham and Wells meals, which divide the marshes from the sandy foreshore. Near the eastern extremity of Holkham meals, stands the High cape beacon, on which tidal and danger signals are hoisted; and in front of the High cape beacon, upon the western side of the channel, is the Scalp beacon, a mast and large globe, visible at a distance of several miles.

The bed of the creek from the bar to the town is dry at low-water, except at the Pool, the general berthing place, where the depth is never less than 5 or 6 feet. The fairway of the entrance is marked by a *red* nun buoy, with staff and cage, in 24 feet; and the channel to as far as abreast the black boat-house has *black* buoys to the westward, and *white* buoys to the eastward, but the number varies with the length of the channel, the direction of this portion of it being subject to change. Above the boat-house it is marked by small beacons. Westerly winds and a spring tide force the channel to the eastward, and neap tides move it back again; but the buoys are moved as changes occur. Vessels drawing 13 feet can get into the Pool on common springs, and those of 11 feet reach the town.

A steam-tug belongs to the port, and vessels are generally towed in and out.

Directions.—In fine weather entry is easy. With the bar and channel in an average state, vessels can sail in with the wind from W.N.W., round northerly, to East. The east windmill at Wells well open to the westward of High cape beacon, or the latter well open to the westward of Scalp beacon, leads to the fairway and bar buoys; proceed up the channel with the black buoys and Scalp beacon to the westward, and with the white buoys to the eastward, and then keep away to the south-eastward for

the Pool, in which, and the channel generally, there is room for about twenty sail.

CAUTION.—Wells should never be attempted by night, nor even during the day by a stranger, except under extreme circumstances. North winds cause the highest sea upon the bar, and vessels embayed between Cromer and the flats in north-east gales should anchor, rather than incur the risk of attempting the entrance. The same precaution as at Blakeney is also necessary, namely, to guard against the easterly going set, which runs strongly across the channel from half-flood to half-ebb.

Tide signals are hoisted by the pilots upon High cape beacon, but though they are familiar to the seamen frequenting the port, a description of them would be of little use to a stranger. A black ball or basket is hoisted at the beacon when it is supposed there is water enough over the bar for the vessel in the offing.

TIDES.—It is high-water, full and change, at Wells bar, at 6h. 20m.; springs rise 18 feet, and 12 feet at the town; high-water occurs 40 minutes later at the town than at the bar.

Off Wells, the flood stream runs to the eastward till 9 o'clock, or 3 hours after high-water on the shore.

HOLKHAM BAY is used as a temporary anchorage by vessels waiting tide to enter Wells harbour. The best position is in 4 or 4½ fathoms, with Deepdale or Brancaster down over the first sand-hill to the westward of Burnham Overy harbour, bearing W. ¾ S.; and Holkham church, S.W. by S. The bottom is clay, and excellent for holding, vessels well found having ridden in it during strong gales.

The COAST.—The beautifully wooded domain of Holkham, formed from a bare sandy waste by the late Earl of Leicester, begins a short distance to the westward of Wells. The hall is not visible from the sea, but Holkham church (*see* view on chart, No. 1455), obelisk, and monument, are all very plain objects among the trees; the former is the most prominent, as it stands upon an artificial mound. With the exception of Holkham Gap, sand-hills extend without interruption to Burnham Overy harbour, and the elevation of the back-land declines gradually towards the latter place.

BURNHAM OVERY.—The small harbour of Burnham Overy on the west side of Holkham bay, and 3 miles from Wells harbour, is formed by the inlet of a tidal creek 3 miles long, assisted by the drainage of the marsh lands on either side of it. Until 1838, the channel outside the meals or sand-hills took an easterly direction across the flat foreshore, but in that year, the present channel, which formed to the north-eastward, was rendered permanent by a breakwater or groyne on the east side, formed of stones, faggots, and wicker-work.

At common springs, there is a depth of 9 feet, and at neaps of 4 feet, up to Burnham Overy staith, the common discharging place, 1½ mile within the bar. The position of the breakwater, which is covered at a few feet flow, is marked by floating spars with vanes, and the west side of the channel by four small *black* buoys, and a beacon with a *black* ball. As the channel is nearly straight, temporary lights are used, and vessels frequently enter and leave it at night in fine weather. A flagstaff stands upon Cape hill, the extremity of the eastern sand-hills, and on this a ball or basket is hoisted when there is the proper depth over the bar for the vessel in the offing.

There is a private quay at the staith, as well as several docks or slips, in which the vessels lie securely while discharging. The trade is principally in exports of corn and flour, and imports of coal and oil-cake.

BRIDE GIRDLE, or Bridgirdle, lies abreast Burnham Overy, between Holkham bay and Brancaster road, and is connected by a narrow neck with 4 feet over it to the shore flat; one portion three-quarters of a mile from the shore dries at low-water springs, and numerous 4 and 5 feet patches extend to the north-westward for upwards of one mile. From the outer end of the dry portion of the shoal, Wells fairway buoy bears S.E. by E. ⅓ E., distant 2¾ miles; and the north-west extremity of Scald head, W. ¼ S., nearly 2 miles.

Buoy.—A *chequered red* and *white* conical buoy with staff and cage lies in 4½ fathoms, northward of all the shoal patches of the Bridgirdle; with a roadway, in line with the middle of High Scald head, bearing S.W. ½ W.; Burnham high mill, midway between two woods, S. by W. ½ W.; the Scalp beacon, in line with the south end of Stiffkey wood, S.E. ¾ S.

Holkham church and obelisk in line, bearing South, clears the Bridgirdle, passing to the eastward; and Brancaster windmills, well open of Scald head, S.W. ½ W., clears the shoal part of the sand, passing to the north-westward, and leads into Brancaster road in 12 feet at low-water.

Scald Head.—Sand-hills continue to the westward of Burnham Overy harbour; at first there are a few hummocks above the general level, called the Ragged hills, but at 2 miles to the westward of the harbour, they attain a higher elevation, and end abruptly in a long hill, named Scald head. The background from Burnham Overy retires a mile or two, and 2 miles within Scald head is Deepdale or Brancaster down, of a higher elevation than the land about it, and clothed with wood.

TIDAL STREAM.—The flood is said to split in the offing abreast Scald head; one portion running to the eastward until 3 hours after high-water, and the other to the westward till one hour before high-water upon the shore.

BRANCASTER HARBOUR, 6 miles to the westward of Wells harbour, and 3 miles from that of Burnham Overy, is in front of Brancaster down, with its entrance more than one mile to the westward of Scald head; the sand here dries out at low-water one mile from the main, and must be carefully avoided. This small harbour is formed by the inlet of a salt-water creek which enters the flat fore-shore in a general southerly direction and then divides; one branch running eastward to Burnham Overy, and the other westward to Brancaster staith and village.

The channel is marked by *black* buoys and standing beacons on the west side, and by *white* buoys on the east side, and has a winding course to the staith, where is a depth of 9 feet on a common spring-tide.

There are no regular pilots, but assistance may be obtained by hoisting the usual pilot signal. A flagstaff stands upon the hill above the staith, and a ball or basket hoisted halfway up denotes that assistance is ready; and wholly up, that there is water enough over the bar to enter.

At Brancaster staith, vessels lie snugly in a dock near a large dis-used granary, which is a very prominent object from the sea. The trade was at one time considerable, but it is now confined to imports of coal and linseed cake, and to exports of corn and wool.

A Life-Boat is stationed at Brancaster.

BRANCASTER ROAD, in front of the harbour, is formed between the Bride Girdle to the eastward and north-eastward, Burnham flats to the northward, and the Middle to the westward. It is 4 miles in length by about one mile in width, with depths of 3 and 3½ fathoms at low-water; the bottom is a stiff clay. When taking up an anchorage here, due allowance must be made for the rise and fall of tide, amounting to 19 and 20 feet on springs, and 11 feet at neaps. The anchoring marks are, Holkham church, just open of Scald head, bearing S.E. ½ S.; and the west end of Brancaster down, over the granary at Brancaster staith, S. by W. ¾ W.

There is good riding in Brancaster road at all times, but vessels must be well found in ground tackling, as the sea in the whole of the outer part of the anchorage breaks in on-shore gales.

The COAST.—From Brancaster, sand-hills continue to Hunstanton; they are fronted by clay and stones, which dry out for some distance at low-water; behind, the square tower of Brancaster church shows among trees, and there are two white windmills on the outline above it. Then appear in succession the fine old church of Thornham, with its ruined tower; Holme church, a plain and prominent ob-



Brancaster church, S. by W. ¾ W., 2 miles.

ject; and lastly, Hunstanton church and village. Holme hall is a large red brick house at the west end of a wood showing upon the outline a short distance from Brancaster down, and is a very plain object. Brancaster and Ringstead windmills (the former white, and the latter with six fans) also stand boldly forward, and the whole range is elevated and moderately wooded.



Thornham church, S. by W. ¾ W., 2 miles.

THORNHAM, a small and indifferent harbour, is formed by a creek, the channel of which crosses a broad sandy foreshore and is constantly varying in direction and depth. At springs, vessels drawing 9 feet reach Thornham staith upwards of one mile from the entrance; but, at neaps, there is only water for half that draught. The channel is occasionally sluiced out at low-water.

Buoys.—The entrance channel is marked by *black* buoys to the westward, and *white* buoys to the eastward, but it is very intricate.

Hunstanton village is seated upon an eminence, and is much resorted to for sea-bathing; under it begins the noted cliff of red and white chalk forming Hunstanton point, or, as it is sometimes called, St. Edmund or Chapel point, from the ruins of an old chapel standing upon it.

A Life-Boat is stationed here.

HUNSTANTON LIGHTHOUSE (*see* view on chart, No. 1455) is upon the middle, or highest part, of the cliff, 60 feet above high-water, and was built in 1840 to replace one of wood. The light is *fixed* and *white*, except between the bearings S.E. by E. ¼ E. and E. by S. ¾ S., or from the direction of the outer buoy of the Roaring Middle, when it shows *red;* it is elevated 109 feet above high-water, and may be seen 16 miles off in clear weather.



Hunstanton inn.

The inn, at the north-west corner of the village of Hunstanton St. Edmunds (referred to on page 128 as a clearing mark for Docking shoal and Burnham flat) is a large red brick house with outbuildings, standing at the south-west end of Hunstanton cliff, half a mile from the lighthouse. The remainder of the coast of Norfolk from this point to Lynn is diversified and well wooded, and is studded with churches, villages, and detached houses, Snettisham spire, a clearing mark for Lynn Knock, being the chief object.



Snettisham spire, S.S.E., 2 miles.

Thornham, Hunstanton, Heacham, and Snettisham are creeks and out-stations of Lynn custom-house; about 90 vessels, with coal and oil-cake, frequent these places.

BAYS or GORE CHANNEL.—Vessels of light draught bound to Lynn or Boston Deeps with south or south-westerly winds, generally prefer this inner channel between Burnham flats and the Norfolk coast, to that between the flats and the Docking. It is narrow, uneven, and intricate, having the Middle and Sunk to the northward, and Gore and Hunstanton points to the southward.

Gore Middle Buoy.—A *red* conical buoy with staff and globe, marked *Gore Middle*, lies in 14 feet, at the east end of Gore Middle sand, the eastern portion of Middle bank; with Holme church, twice its length eastward of a large barn, bearing S.W. ½ S.; Docking church, just open eastward of a roadway at Thornham, South; and Hunstanton lighthouse, S.W. by W. ¼ W., distant 4 miles.

Directions.—From its direction being parallel to the coast, no clearing or sailing marks of any particular use can be given; but vessels having arrived as far as Brancaster road should steer so as to pass to southward of Gore Middle buoy, keeping about 1½ mile from the shore until abreast Hunstanton point, when the lighthouse kept S.E. by E. will lead into Lynn Deep. In this track the lead is of little use, on account of the uneven character of the bottom.

Besides the foregoing, there are several other passages into Lynn Deep between the Woolpack, Middle, and Sunk, which are occasionally used by coasters and other small craft familiar with the locality.

CHAPTER VI.

CROMER TO ORFORDNESS.

VARIATION, 17° 40′ to 17° 25′ West in 1882.

SEVERAL dangerous shoals which lie in the offing to the eastward and south-eastward of Cromer, will be here noticed before proceeding with the description of the coast.*

LEMAN and OWER, the first in importance, are two banks, 23 and 27 miles east of Cromer, with as little as 5 feet water upon them.

The Leman extends in an irregular form, about 14 miles N.W. by N. and S.E. by S. The south-eastern extremity, in 4 fathoms, is in lat. 53° 3′ 30″, and long. 2° 7′ 30″ E., and its north-western extremity is in lat. 53° 10′ 10″, and long. 1° 48′ 30″ E. There are two elbows in this bank, both convexing to the south-westward; the northern elbow is the shoalest part of the Leman, where a depth of only 5 feet for the extent of a quarter of a mile exists. Between these elbows the prevailing depths are 11 to 13 feet, and from each of them to the corresponding extremities of the bank, the depth gradually increases to 4 fathoms.

BUOYS.—North Leman, a conical buoy, *chequered black* and *white*, lies in 4 fathoms one and half mile N.W. by N. from the shoal patch on the east side of the shoal, with Leman and Ower light-vessel bearing E.S.E., distant 6⅓ miles; North Ower buoy, N.E. by N., 4½ miles; Hasborough light-vessel, S.W. by W., 14½ miles; and Cromer lighthouse, W. by S. ½ S., 24 miles.

South Leman, a can buoy, *striped vertically black* and *white*, lies in 4½ fathoms, at the south-east end of the Leman, with Leman and Ower light-vessel bearing N. by W. ½ W., distant 6 miles; Hammond Knoll buoy, S.W., 14¾ miles; and Smith Knoll buoy, S. ¼ W., 12½ miles.

A vessel nearing the Leman from the westward may, by keeping the lead going, have warning of her approach to it; but on the eastward side the bank is so steep that she may strike the ground before soundings are obtained, particularly with a flood-stream running. It is a remarkable feature of this bank, that throughout its whole extent the shoalest water is on its eastern side, so that in crossing it from the westward, as soon as

* *See* Admiralty charts:—East coast of England, Orfordness to Cromer, No. 1,630; scale, mile = 0·48 inch; North sea, sheet 2, No. 2,182; scale, mile = 0·1 inch.

the shoalest cast is obtained, the lead will immediately drop into 18 and 20 fathoms near the southern end, into 13 and 14 fathoms between the elbows, and into 15 and 16 fathoms near the northern end; the steepest part of the bank being near the northern end, where 20 fathoms is to be found within a short distance from either side of it.

From the north-west end of the Leman, Cromer lighthouse bears W.S.W., distant 23¼ miles; and Hasborough light-vessel, S.W. ½ W., 14½ miles. From the south-east end, in 4½ fathoms, Hasborough light-vessel bears W. ½ N., distant 19¾ miles; and Newarp light-vessel, S.W. (southerly), 20 miles. The last-mentioned course leads close to the south-eastward of the 5-fathoms patch upon the outermost ridge between Hammond and Smith knolls, and to the south tail of Hammond knoll.

TIDES.—At the Leman, it is high-water, full and change, by the ground, at 6 o'clock, the flood stream then running S. ½ W., 2 knots, but gradually veering to the westward till three hours ebb, when it sets S.S.W. ½ W., less than one knot, and becomes slack till five hours ebb, or 11 o'clock. It then springs up at N.N.W. ½ W., and strengthens as it veers to the northward till a little after low-water, when it runs 2 knots N. ½ E., but inclining to the eastward, and diminishing in strength till four hours flood, or 4 o'clock. It may be observed, that the flood stream springs up setting S.S.E. ½ E. and terminates S.S.W. ½ W.; that the ebb stream begins N.N.W. ½ W., and terminates E.N.E.; and that the respective streams are at their full strength (2 knots) at high and low waters, and that it is slack water between the third and fourth hours of flood and ebb.

The Ower is by far more dangerous, and also more irregularly formed, than the Leman; it has its southern extremity, in 4 fathoms, in lat. 53° 8′ 20″, and long. 2° 4′ 15″ E., and its northern extremity (at the same depth) in lat. 53° 14′ 40″, and long. 1° 51′ 00″ E. This bank has also two elbows, both lying in the same parallel of latitude, viz., 53° 11′ 20″, the eastern one being in long. 1° 59′ E., and the western one in 1° 54′ 30″ E.; the eastern elbow convexes to the north-eastward, and the western to the south-westward, by which features, and their relative bearings, the Ower may be readily distinguished from the Leman, when breakers or the strength of the stream show the positions of the banks.

From the southern end to the eastern elbow, the Ower, like the Leman, has its shoalest water on the eastern side, the prevailing depths being from 11 to 15 feet. This shoal ridge from thence runs across the bank to the western elbow, and there terminates in an extensive patch having 5 feet over it, and its western side steep-to. To the northward of this patch, the

bank is more regularly formed, still, however, the eastern side is the steepest, and most difficult to approach by the lead. Midway across the bank, and half a mile to the northward of the above-mentioned patch, is a hole of 4½ fathoms with 2½ fathoms on either side. At 1¼ mile N.N.W. from the above patch, there is a shoal part of some extent with only 11 feet upon it, and which shows very conspicuously by breakers when the sea is running.

That portion of the bank between the southern end and the western elbow, has its position indicated by smooth and rippling during the strength of the stream, as is also the case with the Leman; but to the northward of this elbow the bank is not so strongly marked, by reason of its more regular formation, and the stream of the tide not setting so obliquely upon it.

The northern extremity of the Ower bears from that of the Leman N.N.E. ¾ E., distant 4½ miles; and the shoal patch of the Ower bears from that of the Leman (and which are the nearest parts of the banks) N.E. by E., 3¼ miles.

BUOYS.—The Ower is marked by two buoys, viz.:—

North Ower, conical, *black*, in 13 fathoms, with the light-vessel bearing S.S.E., distant 7 miles; and the North Leman buoy, S.W. by S., 4½ miles.

South Ower is a *black* can, in 5 fathoms, with the light-vessel bearing N.W. ½ W., distant 2⅓ miles; and Newarp light-vessel, S.W. by S., 24 miles.

TIDES.—At the Ower, it is high-water, full and change, at 6h. 30m. At 7h. 30m. the flood-stream runs at its full strength (2 knots) S. by W., and veers round towards the west, as at the Leman, and at 10 o'clock terminates at S.W. by S. At 12h. 30m. the ebb commences N.W. by N. and soon attains its full strength (2 knots). At 1h. 30m. it sets N. by W. ¼ W., and at 4h. 30m. terminates at East. At 5h. 30m. the flood-stream commences at S. by E., and gradually changes to S. by W. at one hour after high-water. The stream of both flood and ebb runs over the shoal ridges of the Leman and Ower with an increased velocity equal to nearly double its common strength.

LEMAN and OWER LIGHT-VESSEL is moored between the sands, but nearer the south-east tail of the Ower, in 16 fathoms; lat. 53° 8′ 30″, long. 2° 1′ 30″ E.; S.E. ¾ S. 3½ miles from the shoalest spot upon the Ower, and E. by S. 4¾ miles from the shoalest spot upon the Leman. She exhibits one *white* light, which shows *two flashes* in quick succession *every half-minute*, at 38 feet above the sea, and visible in clear weather at the distance of 10 miles.

The attention of the seaman is particularly directed to the character of this light being *group flashing*.—The *two flashes* occur quickly one after the other, and are followed by a comparatively long interval of darkness; the intervals being, approximately—*two and half seconds* of light, *five seconds* of darkness—*two and half seconds* of light, *twenty seconds* of darkness.

Fog Signal.—In thick or foggy weather, a gong is sounded.

The vessel has two masts, and during the day carries a ball at each masthead.*

From the light-vessel, South Ower buoy bears S.E. $\frac{1}{2}$ E., distant $2\frac{1}{3}$ miles; North Leman buoy, W.N.W., $6\frac{1}{3}$ miles; Hasborough light-vessel, W. by S. $\frac{1}{2}$ S., $18\frac{1}{2}$ miles; Newarp light-vessel, S.S.W. $\frac{1}{2}$ W., $23\frac{3}{4}$ miles; Dudgeon light-vessel, N.W. by W. $\frac{1}{2}$ W., $38\frac{1}{2}$ miles; and Outer Dowsing light-vessel, N.W. $\frac{1}{4}$ N., $39\frac{1}{2}$ miles.

CAUTION.—It must be remembered that as the light-vessel is placed in the midst of the shoals, and is only intended to mark their general position, she must never be approached in any direction, either by night or by day.

WELL, BROKEN, and SWARTE BANKS, are ridges having, respectively, 3, 5, and 6 fathoms upon them, and lying 4, 8, and 14 miles to the eastward of, and parallel to, the Leman and Ower. The greatest depths between these ridges are from 20 to 22 fathoms, and if the lead be used in good time they may be identified, and thus serve to indicate the approach to the above dangerous shoals.

SMITH KNOLL is a narrow ridge 20 miles long. The north-west end of the shoal, with 9 fathoms upon it, is to the south-westward of, and separated by a channel 4 miles wide from, the south-east extremity of the Leman, and from it Hasborough light-vessel bears W. $\frac{1}{2}$ N., distant $14\frac{1}{2}$ miles; Cromer lighthouse, W. $\frac{1}{2}$ N., $25\frac{1}{2}$ miles; and Leman and Ower light-vessel, N.N.E. $\frac{1}{4}$ E., 8 miles. From this point, the direction of the shoal for $5\frac{1}{2}$ miles is S.E., then S. $\frac{1}{2}$ E. for $6\frac{1}{2}$ miles, and for the remaining 8 miles S. $\frac{1}{2}$ W.; it ends in 10 fathoms, with Newarp light-vessel bearing W.N.W., distant $13\frac{1}{2}$ miles. The least water ($2\frac{1}{2}$ fathoms) is nearly midway along the shoal, with Newarp light-vessel bearing W. by S. $\frac{1}{4}$ S., distant $13\frac{3}{4}$ miles, from whence it deepens gradually towards the extremities. The ridge is scarcely more than half a mile wide in any part; there are depths of 23 and 24 fathoms within one mile on the east side, and about 5 fathoms less at the same distance from the western side.

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* *See* regulations respecting light-vessels, foot-note, page 101.

Buoy.—At the east side of Smith knoll is a large *black* conical *automatic sound* buoy, in 20 fathoms at low-water.

TIDAL STREAMS.—The rate of the tide stream at the south end of Smith knoll is 2½ knots per hour in springs, and one knot at neaps. The sets near the north-west end are north and south, and about the middle and south end N.N.E. and S.S.W., drawing in each case, during the latter part of the flood, more to the westward, and of the ebb to the eastward, but they are much influenced by the wind.

The MIDDLE GROUND of the fishermen lies between Smith knoll and Winterton ridge; the depths over it are from 18 to 20 fathoms, and the bottom is fine brown sand and clay.

There are two shoal ridges between the north-west end of Smith knoll and Hammond knoll; the outer one, 10 miles long, lying in a north-west and south-east direction, has patches of 5 fathoms; the other lies N.N.W. and S.S.E., is 5 miles long, and has 7 fathoms upon it; they are so situated as to form three channels of nearly equal breadth between the above-mentioned knolls, with 17 to 20 fathoms in them.

HAMMOND KNOLL is parallel to, and only 2 miles outside, the south-east extremity of Hasborough sand; its general direction is N. by W. ¾ W. and S. by E. ¾ E., and it is 7 miles long from a depth of 10 fathoms on each end, and one mile broad. The least depth (3 fathoms) is nearly midway along it. From a depth of 5 fathoms towards the north end of the shoal, the south buoy of Hasborough sand bears S.W. by S., distant 3½ miles; and from 5 fathoms near the south end, the same buoy is W. by N. ¾ N., 3⅚ miles. There are depths of from 14 to 16 fathoms close to on either side.

Buoy.—A can buoy, *striped vertically black* and *white*, and marked "Hammond Knoll," lies, in 7 fathoms, near the south-west part of the knoll; with Winterton lighthouse bearing W.S.W., distant $11\frac{8}{10}$ miles; Newarp light-vessel, S.W. ½ S., southerly, $5\frac{7}{10}$ miles; and South Hasborough buoy, N.W. by W. ¾ W., $3\frac{4}{10}$ miles.

TIDES.—Near the north end of Hammond knoll, the tidal stream runs in various directions; thus, it is high-water, full and change, by the ground, at 7h. 40m., and low-water about 1h. 30m.; but the stream is slack, drawing N.E. and easterly till four-hours flood, or 5h. 30m., when it begins to run S. by E. at the rate of half a knot; at five-hours flood, or 6h. 30m., it runs South one knot; and at high-water, 7h. 40m., its rate is 1¾ knot in a S. ½ W. direction, still veering with the sun; at 8h. 40m., or one-hour's ebb, it runs S. by W., one knot; and at two-hours ebb, S.S.W., half a knot: it then slackens, and veers round by the West and N.W. to

N.N.E., in which direction it runs during the remainder of the ebb, its greatest velocity being 2 knots.

WINTERTON RIDGE, upon which H.M.S. *Invincible* was lost in 1807, is to the south-eastward and nearly in continuation of Hammond knoll, a channel only one mile wide intervening. This shoal is 5 miles long, in a N. ¾ W. and S. ¾ E. direction, from 10 fathoms upon each end, and ¾ mile broad. Formerly, the least water upon it was 2 fathoms, but now it is said there is a depth of 7 feet near the centre; there are 15 and 16 fathoms on each side, and from 12 to 14 fathoms between it and Hammond knoll.

Buoy.—A large conical buoy, *striped horizontally red* and *white*, and carrying a staff and cross, lies in 4½ fathoms, towards the south end of the shoal portion of the ridge; with Winterton church, appearing nearly midway between Winterton lighthouse and Martham church, bearing W. ½ S.; Lowestoft high lighthouse, S.W. (southerly), distant 21½ miles; Newarp light-vessel, W. by S. ¼ S., 6¼ miles; Winterton lighthouse, W. ¾ S., 13½ miles; Hasborough high lighthouse, W. by N. ¾ N., 18¼ miles; South Hasborough buoy, N.W. ¾ W., 7½ miles; and Leman and Ower light-vessel, N. by E. ½ E., 20 miles.

In fine weather, the ripple of the tide over the ridge, and the break of the sea upon it at other times, will generally show its position.

TIDES.—Two miles within Winterton ridge, it is high-water, full and change, by the ground, at 7h. 50m., and low-water at 1h. 40m. At two-hours flood (3h. 40m.) the stream sets N.N.E. ¼ E., 1¼ knot, and then falls slack until 4 hours-flood (5h. 40m.), when it sets S.E. by S., half a knot, then veering to the southward and increasing in strength till high-water (at 7h. 30m.), at which period it sets South at the rate of 2¼ knots. At one-hour's ebb (or 8h. 50m.) it sets S. ½ W., at the diminished rate of 1½ knot, and at two-hours ebb, S. by W., one knot. It then falls slack, and veers to S.W., West, and N.W., until four-hours ebb (11h. 50m.), when it sets N. ¼ E., half a knot, the rate increasing to 2¼ knots at low-water, when the set is N.N.E., and it gradually becomes weaker until the fourth hour of the following flood.

The WOULD, a channel 14 miles long and 7 miles wide, begins abreast Cromer, and is continued between Hasborough sand and the coast of Norfolk, with the outlets, Hasborough gatway to the south-eastward, and Cockle gatway to the southward.

The COAST from Cromer to the south-eastward continues high for one mile, with indications of extensive land slips; in fact, the whole of the mud cliffs (as they are termed), from Cromer to Hasborough, being formed

of diluvial matter, especially clay with masses of chalk imbedded in it, are subject to incessant inroads of the sea. The church and pretty village of Overstrand, one mile to the southward of Cromer lighthouse, stand back from a lower part of the cliff, and behind are well-wooded hill and dale; a white windmill is prominent to the south-eastward of the village. The cliff again rises towards Sidestrand church. The village of Trimmingham is back a little from the coast line, having near its centre a small church with a stunted tower. Trimmingham signal-house is a prominent object on high ground half a mile south-east of the village.

Rockets and lines are kept at Sidestrand in case of wreck.

MUNDESLEY.—The cliff, generally of uniform height from Sidestrand to Trimmingham, gradually declines towards Mundesley, which is seated in a score or break in it; here, several large barriers or breakwaters have been built to resist the encroachment of the sea. The village is small and well built, and has a coast-guard station. The church (a portion of which is in ruin) stands to the northward of the village, near the brink of the cliff; it is a small building without a tower.

Life-Boats.—A life-boat, rockets, &c., are maintained at Mundesley, and also at Bacton.

Beyond Mundesley, the cliff, continuing high for more than one mile, then descends to Bacton, and to Hasborough; the average height is not more than 20 feet. Several churches with square towers show behind the coast line.

HASBOROUGH, Haisborough, or Happisburgh, as it is variously termed, stands upon a rounded hillock a short distance back from the cliff, and but few of the houses are seen from the sea. The church adjoining the north-west side of the village is one of the most prominent objects on the coast. It is a lofty structure, with an embattled tower 150 feet high. Owing to the cliff in front having an under-stratum of sand and gravel, the sea has made rapid advances upon it, and a breadth of 170 yards of coast has been lost in 60 years.* Should the same destructive action continue, both church and village will have been swept into the sea by the middle of the ensuing century.

Life-Boat.—Hasborough is a life-boat, and rocket, station.

LIGHTS.—Hasborough lighthouses, erected in 1791 to lead through Hasborough gatway, stand half a mile to the south-eastward of the village; they are painted white, are half a mile apart, and bear N.W. $\frac{3}{4}$ W. and S.E. $\frac{3}{4}$ E. from each other. Both lights are *white* and *fixed*; one is elevated 137 feet, and the other 94 feet above high-water, and they may be seen 15 to 17 miles off in clear weather.

* This was written in 1858.

The whole of the shore from Cromer to Hasborough is clear, and may be approached with the lead, except abreast Trimmingham, where a patch of $4\frac{1}{2}$ fathoms extends $1\frac{1}{2}$ mile off, and another patch with $4\frac{1}{2}$ fathoms upon it lies about E. $\frac{3}{4}$ N. $1\frac{1}{8}$ mile from Hasborough low lighthouse, for which reason the shore thereabouts should not be approached nearer than into a depth of 9 fathoms.

The change from cliff to sand-hills occurs half a mile to the southward of Hasborough low lighthouse. The sand-hills are from 30 to 40 feet high at Palling, and lower from thence to Winterton-ness. The chief objects which present themselves are, the ruined octagonal tower of Eccles church, now within a stone's cast of the sea, and Wraxham, and several other tower churches.

Two Life-Boats, and rocket apparatus, are stationed at Palling.

The shore from Hasborough to Winterton-ness is clear, and may be approached by the lead.

TIDAL STREAMS.—Four miles off Hasborough, the flood-stream runs to the southward till 10h. 15m., or 1h. 51m. before high-water at Harwich, and the ebb in a contrary direction.

HASBOROUGH SAND, the eastern boundary of the Would, has its north end with Cromer lighthouse bearing W. $\frac{1}{4}$ N., distant 12 miles; and the south-east end of the Leman, E. $\frac{1}{4}$ S., $18\frac{1}{2}$ miles; with a slight divergence, it extends thence S.S.E. $\frac{1}{4}$ E., $10\frac{3}{4}$ miles, leaving a clear passage about 6 miles wide between itself and the main. The shoal is in general one mile broad; it is steep-to, there being 15 and 16 fathoms within half a mile on both sides, and it nearly dries in several places. A tail, having 4 to 7 fathoms upon it, projects from its south end N. $\frac{1}{2}$ E., 4 miles, and nearly connects it with the north end of Hammond knoll.

LIGHT-VESSEL.—A light-vessel carrying two *fixed white* lights at equal heights on separate masts, each light being 35 feet above the sea, and visible at the distance of 10 miles in clear weather, is moored $1\frac{1}{4}$ mile to the westward of the north end of Hasborough sand, in 15 fathoms; the vessel carries a ball at each mast-head.

Fog Signal.—In thick or foggy weather a gong is sounded.*

The vessel lies with Bradfield church, its length open of Mundesley church, bearing W.S.W.; North Hasborough buoy, E.N.E., distant $\frac{9}{10}$ mile; Cockle light-vessel, South, $17\frac{1}{2}$ miles; Hasborough high light-house, S.W. by S., $8\frac{8}{10}$ miles; Cromer lighthouse, W. $\frac{1}{3}$ N., $10\frac{9}{10}$ miles; Dudgeon light-vessel, N.W. $\frac{3}{4}$ N., 29 miles; Outer Dowsing light-

* *See* regulations respecting light-vessels, foot-note, page 101.

vessel, N. by W. ¼ W., 36½ miles; and Leman and Ower light-vessel, E. by N. ½ N., 18½ miles.

BUOYS.—The following buoys also mark the sand:—

North Hasborough, a can, *chequered black* and *white*, lies in 8 fathoms; with Hasborough light-vessel, W.S.W., distant $\frac{9}{10}$ mile; and North Middle Hasborough buoy, S. ¾ E., $2\frac{3}{10}$ miles.

North Middle Hasborough, an 8-feet cylinder, *striped vertically black* and *white*, lies in 10 fathoms, with East Ruston and Hasborough churches in line bearing S.W. ½ W.; North Hasborough light-vessel, N.N.W. ¾ W., distant $2\frac{3}{10}$ miles; North Hasborough buoy, N. ¾ W., $2\frac{3}{10}$ miles.

Middle Hasborough, cylinder, *chequered black* and *white*, in 11 fathoms; with Edingthorpe and Bacton churches in line, bearing W. ½ S.; South Middle Hasborough buoy, S.S.E. ¾ E., 3 miles; and North Hasborough light-vessel, N.N.W. ¾ W., distant 5 miles.

South Middle Hasborough, cylinder, *striped vertically black* and *white*, lies in 10 fathoms; with East Ruston mill, in line with Hasborough high lighthouse, bearing W. ½ S.; South Hasborough buoy, S.E. ½ S., distant 3⅓ miles; Middle Hasborough buoy, N.N.W. ¾ W., 3 miles; and Hasborough church, W. ¼ S., 8¾ miles.

S.W. Hasborough, a can buoy, *chequered black* and *white*, lies in 11 fathoms, on the south-west side of the sand; with Hasborough low lighthouse, open twice its length southward of East Ruston mill, bearing W. ½ N.; Waxham church tower, twice its length northward of Hickling church, W. by S. ¼ S.; South Middle Hasborough buoy, N.N.W. ¾ W., $1\frac{8}{10}$ mile; and South Hasborough buoy, S.E. by E., 1½ mile.

South Hasborough, a conical buoy, *striped vertically black* and *white*, with staff and cage, lies in 10 fathoms; with Hasborough low lighthouse, open twice its length northward of Ruston mill, bearing W. ¾ N.; Winterton mill, nearly midway between the lighthouse and look-out, S.W. ¾ W.; Hammond Knoll buoy, S.E. by E. ¾ E., $3\frac{4}{10}$ miles; Newarp light-vessel, S. ½ W., distant 6 miles; S.W. Hasborough buoy, N.W. by W., 1½ mile; and Would light-vessel, W. ½ S. westerly, 2 miles.

East Hasborough, a monster conical *black* buoy, with staff and globe, lies in 15 fathoms, on the east side of, and nearly midway along, the sand; with South Repps church, in line with a mill northward of Mundesley, bearing W. by N.; Bacton church tower, twice its width southward of Edingthorpe church, W. ¼ S.; Hickling and Palling churches in line, S.W. ¾ W.; and Middle Hasborough buoy, W. by N., distant 2 miles.

WOULD LIGHT VESSEL is moored off the south end of Hasborough sand, in 15 fathoms, with S.W. Hasborough buoy bearing

N.E., distant $1\frac{2}{10}$ mile; South Hasborough buoy, E. $\frac{1}{2}$ N. easterly, 2 miles; and Newarp light-vessel, S. by E. $\frac{1}{4}$ E., 6 miles. She exhibits a *quick-revolving* light, showing a *flash every five seconds*, at 38 feet above the sea; and visible at the distance of 10 miles in clear weather.

The attention of mariners is particularly directed to the difference in character between the Would light and that of the Newarp and the Leman and Ower light-vessels;—The Would is, as described above, a *quick-revolving* light, showing a flash *every five seconds*; but the Newarp and Leman and Ower are *group flashing* lights, the Newarp showing *three flashes* in quick succession, followed by an interval of *thirty-six seconds* of darkness (the whole revolution occupying *one minute*); and the Leman and Ower giving *two quick flashes*, followed by *twenty seconds* of darkness, and repeated *every half minute*.

The Would light-vessel has one mast with a diamond.

Fog Signal.—In thick or foggy weather a gong is sounded.*

TIDAL STREAMS.—At Hasborough light-vessel, the general direction of the flood and ebb streams is S. by E. and N. by W., and their rate during springs is 3 knots per hour.

WINTERTON SHOAL, which is irregular in form, lies at the southern end of the Would between Winterton-ness and the Newarp; it is about $2\frac{3}{4}$ miles long in a north and south direction and $1\frac{3}{8}$ mile broad, with from $4\frac{3}{4}$ to 10 fathoms water over it, the shoalest portion being E. $\frac{3}{4}$ N., $3\frac{3}{4}$ miles from Winterton lighthouse.†

HASBOROUGH GATWAY, the south-eastern outlet from the Would, is between the three shoals, Hasborough sand, Hammond knoll, and Winterton ridge to the north-eastward, and Winterton shoal and the Newarp to the south-westward; it is a clear passage 4 miles wide, with from 11 to 20 fathoms depth in it.

Directions for the Would and Hasborough Gatway.—In navigating the Would, there is little difficulty if the lead be properly attended to; there is foul ground for $1\frac{1}{2}$ mile off Cromer, at the same distance off Trimmingham and Hasborough low lighthouse are patches of $4\frac{1}{2}$ fathoms, and Winterton-ness is fronted by a shelf with 3 fathoms upon it extending out half a mile; with these exceptions the shore is clear and may be approached at discretion. In the middle of the Would the depths are irregular, and a vessel standing towards Hasborough sand should tack on the first shoal cast, as there are 15 and 16 fathoms within half a mile of it.

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* *See* regulations respecting light-vessels, footnote, page 101.

† Winterton shoal is reported to have extended in a northerly direction for a distance of about 8 cables. 9th *September*, 1881.

There are two outlets from the Would to the southward and south-eastward, namely, by Cockle gatway, or through Hasborough gatway, and so round by the back or outside of Yarmouth sands. The latter is considered the safer passage by night, and is so at all times for vessels of heavy draught. Having arrived at a fairway abreast Hasborough, bring Hasborough lighthouses in line, bearing N.W. $\frac{3}{4}$ W.; this mark directs to Newarp light-vessel, which should be passed leaving her to the south-west, but, should the wind be strong from the eastward, the high lighthouse may be kept well open to the northward of the low lighthouse, so that the ship may pass 2 or 3 miles to windward of Newarp light-vessel; care must, however, be taken while proceeding out, that Hasborough lighthouses be kept on about a W. by N. $\frac{3}{4}$ N. bearing, and that the ship does not pass to the north-eastward of the Would light-vessel in order to avoid the south end of Hasborough sand. Having rounded Newarp light-vessel, continue on for fully $7\frac{1}{2}$ miles, or till Winterton lighthouse appears to the northward of N.W., before bringing Newarp light-vessel to the eastward of North, so as to clear Cross sand. Then the general coasting course, S.S.W. $\frac{3}{4}$ W., may be steered.* (*See* page 176.)

In fine weather, and westerly winds, Newarp ridge may be crossed, thus avoiding the long round to leeward of Newarp light-vessel. In crossing the ridge keep Winterton lighthouse to the westward of W. $\frac{3}{4}$ N., or Cockle light-vessel to the southward of W. by S. $\frac{1}{2}$ S. There is not less than 8 fathoms on every part of the ridge, a description of which is given at page 171. During stormy weather the sea breaks upon the ridge, and it must then be avoided.

Bound into the Would from outside Yarmouth sands, and having sighted Newarp light-vessel, keep her to the westward of North while nearing her, and when she has been passed, Hasborough lighthouses in line, bearing N.W. $\frac{3}{4}$ W., or the high lighthouse open to the northward of the low lighthouse, leads through as before stated. Should the wind in such a case be scant from the westward, the seaman must be careful to keep Newarp light-vessel to the eastward of S.S.E. $\frac{1}{4}$ E., and to pass to the south-westward of Would light-vessel, to insure clearing Hasborough sand.

TIDAL STREAMS.—In Hasborough gatway the general directions of the flood and ebb streams are S.S.E. and N.N.W., setting fairly through it, but across Newarp ridge. The latter circumstance must be carefully attended to while closing Newarp light-vessel. The flood-stream in the gatway runs to the southward until 10h. 30m., and the rate averages in common springs 3 knots per hour.

WINTERTON-NESS is distinguished by a high sand-hill, upon

* **Caution.**—Considerable alterations having taken place in Cross sand, it would be dangerous to pass westward of the buoys marking it, until within a short distance of Newarp light-vessel.—8th September 1880.

which is a red-tiled house and a flagstaff. The village of Winterton is behind the sand-hills, but the lofty tower of its church is a fine sea-mark.

Buoy.—The ness is fronted by a shoal shelf extending half a mile out, with 3 fathoms upon it. It is marked on the outside by a *red* can buoy, in 5 fathoms; with Winterton church, on with the south end of a grove of trees, bearing S.W.; and Winterton lighthouse, just to the southward of a red-tiled building, S.S.W. ¾ W. A berth of one mile from the shore, or a depth of 10 fathoms, will clear it.

WINTERTON LIGHTHOUSE, erected in 1790, stands on an eminence one quarter of a mile to the southward of Winterton, and a little back from the shore. The tower, 69 feet high, is painted red, and it exhibits at 110 feet above high-water a *fixed white* light, which may be seen in clear weather at the distance of 14 miles.

Life-Boats.—Two life-boats, and the usual apparatus for effecting communication with stranded vessels, are stationed at Winterton.

CAISTER, or Caistor.—Sand-hills bound the shore from Winterton to Caister, and the towers of Hemesby and Ormesby churches appear above them; the sand-hills end at Caister, and a low shingle beach extends from thence to Yarmouth. Caister, though now an unimportant village, was the principal station of the Romans in the country of the Iceni. The coastguard watch-house upon the end of the sand-hills, the church, and several windmills, are the chief objects visible from the sea.*

Life-Boats.—A life-boat, rockets, &c., are stationed at Caister; and there is also a life-boat station between Caister and Yarmouth.

YARMOUTH stands upon a low narrow strip of land between the Yare and the sea, on what was a detached sand-bank till the eleventh century, and there are various remains which prove that the sea, at a remote period, filled the valleys of the Waveney, Yare, and Bure, its exclusion being probably due to change in the disposition of the sands, and also to a series of progressive embankments. The town, 2 miles from the mouth of the Yare on its left bank, is about one mile long and half a mile across; it is connected by a lift-bridge



St. Nicholas church, Yarmouth, W. ¾ N., 1 mile.

* *See* Admiralty chart of Yarmouth and Lowestoft roads, No. 1,543; scale, mile = 2·4 inches; with plans of Yarmouth haven, and Lowestoft harbour.

with the suburb, Southtown, and thereby with Gorleston, at the mouth of the river. There are numerous windmills and several factory chimneys in the immediate neighbourhood; and among the principal objects in the town are, the fine old church of St. Nicholas, the Naval hospital, Militia barracks, Trinity look-out tower, and Nelson monument; the latter is 144 feet high, and was erected in 1817. Several handsome terraces front the sea, and there are batteries to the north and south of the town.



Nelson monument, N.N.W., 1 mile.

Piers.—Wellington pier, a short distance to the southward of Yarmouth jetty, is a favourite promenade with visitors; and Britannia pier is at the north end of the town; the head of the latter pier being marked by a *fixed green* light.

Signal Station.—At Yarmouth is a signal-station with which passing vessels may communicate by means of the International Code. *See* footnote, page 88.

CAISTER LIGHTS.—A *fixed red* light is exhibited from a window of the Sailors' Home, Yarmouth, at an elevation of 60 feet above high-water; and another *fixed red* light is shown from Britannia pier, at 20 feet above high-water. These lights in line, bearing S.W. ½ S., leads two cables eastward of Caister Elbow.

Besides its numerous fishing vessels, the port employs a large number of vessels in the foreign and coasting trade; it exports corn and fish, and receives coal, timber, linseed, oil cake, cheese, and salt. Yarmouth derives additional importance from its being the chief rendezvous for the British, French, and Dutch fishing vessels; the inland trade also is considerable. Ship-building is extensively carried on, as well as malting. Vice-consuls for most foreign nations are resident.

The arrivals at Yarmouth in 1880 were 1,381 vessels, of 158,735 tons; and on the 1st of January, 1881, 706 vessels, of 30,249 tons, belonged to the port. Population, 46,211 in 1881.

Life-Boats.—Two life-boats, with rockets, &c., are stationed here, and there are also two life-boats at the haven.

YARMOUTH HAVEN is the common outlet of the rivers Yare, Waveney, and Bure. The Yare has a course of 74 miles; the Waveney and the Bure are each about 50 miles in length; and in the three rivers Yarmouth possesses 123 miles of uninterrupted inland navigation. The Yare and Waveney unite 3½ miles above Yarmouth, at the upper end of a

large expanse named Breydon water, which is 3 miles long and half a mile wide, and is principally occupied by muddy flats; its width becomes contracted near the north end of the town, whence, receiving the waters of the Bure, the united streams flow uninterruptedly to the sea.

Yarmouth haven was of importance at an early period, and has undergone numerous changes, the entrance having successively occupied seven different positions. The south pier, built in 1566, extends in an easterly direction nearly at a right angle to the lower reach of the river, and is 450 yards long; the north pier was built in 1815, and lengthened in 1824 and 1868; it is 200 yards long, and projects 100 yards farther eastward than the south one; both piers are of wood; the distance between them is 250 feet, but the clear width is contracted by fender piles to 209 feet.

LIGHT and SIGNAL.—A red flag is hoisted by day, and a *red* light is exhibited by night, upon the south pier, during the time the flood-stream is running into the haven. A *green* light is shown immediately the ebb makes out, and is continued until the water has fallen to one foot above zero; it is again shown when the water has risen to one foot above zero, and until the flood stream enters the haven.

In strong southerly and easterly gales when the sea breaks outside the bar, rendering it dangerous for smacks or luggers to enter, the green light is not shown.

The light is visible for a distance of 2 miles in clear weather, from the bearings S.W. by W. $\frac{3}{4}$ W., round westerly, to North.

Bar.—A bank named the North stretches to the north-eastward from the north pier-end. A *black* can buoy, marked North Bank, lies to the eastward in $5\frac{1}{2}$ fathoms at low-water, with the westernmost mill at South-town, in line with the gasometer at Yarmouth, bearing N.N.W.; Pilot-house shut in with the north pier-head, S.W. by W. $\frac{1}{2}$ W.; St. Nicholas light-vessel, E. by N., distant $\frac{9}{10}$ of a mile. A south-westerly extension of this bank, continued across the entrance of the haven, forms the bar, a flat of shingle and sand, from 200 to 300 feet in breadth, and which is longer or shorter according to the prevalence or otherwise of northerly winds. In 1828 the bar used to dry, and there was as little as 6 feet upon it as late as 1836; but now, owing to the improved state of the channel above, a depth of 8 feet at low-water is steadily maintained, and vessels drawing 13 or 14 feet* are able to enter during spring tides. The direction of the entrance is E. $\frac{1}{2}$ S. and W. $\frac{1}{2}$ N., but the deep water into the haven approaches close to the south pier-head from a south-easterly direction.

For some years past improvements in Yarmouth haven have been steadily carried out. Many impediments have been removed, shoals have been cut

* The pier-master states that vessels drawing 14 or 15 feet are able to enter during spring tides. (December, 1881.)

through, the bed of the river has been made generally uniform in width and depth, the former averaging 270 feet from the pier to the town, and the latter having been increased from 8 to 10 feet at low-water; the banks have also been protected by sheet piling.

The waterway of Yarmouth bridge has also been increased from 146 feet to 180 feet, and the lifting portion of the bridge is 50 feet across. Though much has by these means been effected, the accommodation is still insufficient for the trade of the port; and the Brush, the abrupt turn at the inner end of the south pier, yet remains as a serious impediment to the navigation.

The aid of a pilot is necessary in entering Yarmouth harbour, and few accidents, except of a trifling nature, occur. Light vessels and small craft may enter at most times, but loaded vessels should not attempt it when there is a heavy sea upon the bar, especially as the noble roadstead in front renders the doing so for refuge unnecessary. Risk is also incurred by attempting the harbour when the ebb stream is running out, as it strikes a vessel on the port bow, and forces her over towards the "North."

Steam tugs are commonly used.

Pilots.—The pilotage service at Yarmouth is conducted by 28 pilots, half of whom are also qualified to take charge of vessels through the various gatways connected with Yarmouth road.

Gorleston stands upon the steep right bank of the Yare, near its outlet. The church with three gables, and two windmills, are plain objects. Cliff of one general height extends from Gorleston to Corton.

YARMOUTH SANDS AND ROAD.

Opposite the section of coast last described, are numerous sands lying at the average distance of $1\frac{1}{2}$ mile, and parallel to the shore; the main body of them are shallow at low-water, and they cover in and defend the invaluable anchorage Yarmouth road.*

WINTERTON OVERFALLS, with $5\frac{1}{2}$ and 6 fathoms upon it, lies between Winterton shoal and the north end of the Scroby. It is generally marked by strong ripplings, and by a breaking sea when the ebb stream is opposed by a north-east wind.

COCKLE SAND, the northernmost of the dangers, lies inshore to the southward of Winterton-ness. Its north end, in 5 fathoms, is E. $\frac{3}{4}$ S., $1\frac{3}{4}$ mile from Winterton lighthouse, from whence its outer margin trends S. $\frac{1}{2}$ E. for $1\frac{1}{4}$ mile, and then in a general S. by W. $\frac{1}{2}$ W. and S.S.W. $\frac{1}{2}$ W.

* **Caution.**—The sands and channels in the vicinity of Yarmouth and Lowestoft are subject to frequent change; the charts and sailing directions must therefore be used with great caution.

direction for 4 miles, when it joins the shore at Caister point. This sand is divided into two portions, the northern being named the Cockle, and the southern Caister shoal. The Cockle has from 8 feet to 5 fathoms upon it, but Caister shoal dries. Both the shoals and the swashway between them are subject to constant change.

COCKLE LIGHT-VESSEL lies in 7 fathoms, just within the north end of the Scroby, and exhibits a *revolving white* light, showing a *flash every minute*, at 35 feet above the water, and which may be seen 10 miles off in clear weather.

Fog Signal.—A gong is sounded during thick or foggy weather.*

From this vessel, Nelson monument is on with Britannia pier-head, bearing S.S.W. $\frac{3}{4}$ W.; Lacon's chimney is open to the southward of the red-tiled boathouse on the north denes, S.W. $\frac{1}{2}$ S.; and Winterton church is touching the west side of Winterton lighthouse, N.W.; Newarp light-vessel, E. by N. $\frac{3}{4}$ N., distant $5\frac{9}{10}$ miles; North Scroby buoy, N.E. by E., $\frac{1}{4}$ mile; North Cockle buoy, N. by W., $1\frac{9}{10}$ mile; Caister Elbow buoy, S.S.W. $\frac{1}{2}$ W., $2\frac{6}{10}$ miles; and Scroby Elbow buoy, S. by W. $\frac{1}{2}$ W., $3\frac{1}{2}$ miles.

BUOYS.—The Cockle is marked by the following buoys:—

North Cockle, conical, with *black* and *white horizontal stripes*, and staff and diamond, lies in 8 fathoms; with Caister mill, appearing midway between Caister look-out and Yarmouth spire, bearing S.S.W. $\frac{1}{4}$ W.; and West Somerton church, in line with the southernmost look-out at Winterton, W. by N. $\frac{3}{4}$ N.; N.E. Cockle buoy, S. $\frac{1}{4}$ E., distant $1\frac{2}{10}$ mile; Cockle light-vessel, S. by E., $1\frac{9}{10}$ mile; and Winterton-ness buoy, N.W. by N., $1\frac{8}{10}$ mile.

N.E. Cockle, *black* can, in 10 fathoms; with Winterton church, just northward of the light-keeper's cottages, bearing N.W. $\frac{1}{4}$ W.; California look-out, a little northward of a gap in the south end of a wood at Ormesby, S.W. by W.; Gorleston south mill, in line with Nelson monument, S.S.W. $\frac{1}{2}$ W.; North Cockle buoy, N. $\frac{1}{4}$ W.; S.E. Cockle buoy, S. by W. $\frac{1}{2}$ W., one mile; and Cockle light-vessel, S.S.E., $\frac{8}{10}$ mile.

S.E. Cockle, *black* can, in $6\frac{1}{2}$ fathoms; with Hemesby church, midway between Martham church and a mill to the southward, bearing N.W. by W. northerly; St. Nicholas church spire, its length westward of the mill on the north denes, S.S.W. $\frac{3}{4}$ W.; and Cockle light-vessel, E. by N. $\frac{3}{4}$ N., distant $\frac{6}{10}$ mile.

North Caister, *black* conical buoy, in $8\frac{1}{2}$ fathoms; with Hemesby church, open northward of a white gabled house at Scratby, bearing N.W. $\frac{1}{2}$ N.; St. Nicholas church, between the mill on the north denes and

* *See* regulations respecting light-vessels, footnote, page 101.

the life-boat house, S.W. by S.; West Cockle Spit buoy, N.W. by N., distant one mile; Cockle light-vessel, N.E., $1\frac{3}{10}$ mile.

Middle Caister, *black* cylinder, in 9 fathoms; with Caister mill, the length of its vane southward of Caister look-out, bearing W.S.W.; St. Peter's church, midway between the two northernmost mills at Yarmouth, S.W. by S.; Middle Scroby buoy, E. by S. $\frac{3}{4}$ S., distant $\frac{7}{10}$ mile; Cockle light-vessel, N.E. by N., $1\frac{9}{10}$ mile.

Caister Elbow, *black* cylinder, in $10\frac{1}{2}$ fathoms; with Ormesby church, open to the northward of a white barn on the cliff, bearing N.W. $\frac{1}{4}$ N.; St. Peter's church tower, at Yarmouth, half its breadth open westward of the Roman catholic chapel tower, S.W. $\frac{1}{2}$ S.; Middle Scroby buoy, E.N.E., distant $\frac{9}{10}$ mile; and Middle Caister buoy, N. by E. $\frac{3}{4}$ E., $\frac{7}{10}$ mile.

South Caister, *black* can, in $4\frac{1}{2}$ fathoms; with the water-works column, in line with East Caister church, bearing N.N.W. $\frac{1}{4}$ W.; St. Peter's church and the Roman catholic chapel at Yarmouth in line, S.W. $\frac{1}{2}$ S.; Scroby Elbow buoy, E. by S. $\frac{3}{4}$ S., distant $\frac{7}{10}$ mile; West Scroby buoy, E. $\frac{3}{4}$ N., $1\frac{3}{10}$ mile.

All the foregoing buoys, with the exception of North Cockle, are black, and being on the east and south-east sides of the sands, they mark the western boundary of Cockle gatway and Caister road.

West Cockle Spit, can buoy, *red* and *white vertical stripes*, in 5 fathoms, at the south-west tail of Cockle sand; with Winterton mill, its length westward of some farm buildings, bearing N.N.W. $\frac{1}{4}$ W.; the silk factory chimney, at Yarmouth, its length eastward of a white shed on the cliff northward of Caister, S. by W. $\frac{1}{2}$ W.; S.E. Cockle buoy, E. $\frac{3}{4}$ S., distant $\frac{8}{10}$ mile; and North Cockle buoy, N.N.E. $\frac{1}{2}$ E., $2\frac{1}{4}$ miles.

SCROBY, on the east side of Cockle gatway, is the next sand to the southward, and forms the principal defence to Yarmouth road. The long and narrow northern extremity of this sand begins abreast the body of Cockle sand, and 2 cables N.E. of Cockle light-vessel; 3 fathoms upon it is S. $\frac{3}{4}$ E. three-quarters of a mile from that vessel; from thence the inner or western face of the sand extends (curving to the eastward) S.S.W., $5\frac{1}{2}$ miles, and then about S. by E. $\frac{1}{4}$ E. for $2\frac{1}{4}$ miles to the southern termination, from whence (as in the case of Hasborough sand) it doubles round to the N.N.E. for upwards of 2 miles, with from 27 to 12 feet upon it. Portions of the sand, named North and South Scroby, have from 5 to 2 feet upon them at low-water, and its breadth increases gradually from one-quarter mile to upwards of one mile near the middle of the shoal, when it again forms into a narrow ridge at the southern end.

BUOYS.—North Scroby, a conical buoy, *chequered black* and *white*, with staff and cage, lies in $7\frac{1}{2}$ fathoms at low-water; with St. Margaret church, Ormesby, just open southward of Scratby houses, bearing W. $\frac{3}{4}$ S.; and Winterton church, just open northward of the lighthouse cottages, N.W. $\frac{1}{2}$ W.; N.W. Scroby buoy, S.S.W. westerly, distant $1\frac{1}{4}$ mile; Cockle light-vessel, S.W. by W., $\frac{1}{4}$ mile; and N.E. Cockle buoy, N.W. $\frac{3}{4}$ N., $\frac{8}{10}$ mile.

N.W. Scroby, can, *chequered black* and *white*, in 5 fathoms; with St. Margaret church, Ormesby, just open northward of California look-out, bearing W. by N. $\frac{1}{2}$ N.; Caister mill and look-out in line, S.W. by W. $\frac{1}{4}$ W.; and Cockle light-vessel, N. by E. $\frac{1}{2}$ E., distant one mile.

Middle Scroby, can, *chequered black* and *white*, lies in 8 fathoms; with West Caister church, one-third the distance from East Caister church towards a large house to the southward, near the cliff, bearing West, northerly; St. Peter church, its length westward of the highest mill at Yarmouth, S.W.; and North Caister buoy, N.N.W. $\frac{1}{2}$ W., westerly, distant $1\frac{2}{10}$ mile.

West Scroby, can, *chequered black* and *white*, in $6\frac{1}{2}$ fathoms; with East Caister church tower, its full length northward of Caister look-out, bearing N.W. by W. $\frac{1}{2}$ W.; Southtown highest mill, just open northward of St. Nicholas church, S.W. by W. $\frac{3}{4}$ W., southerly; and South Caister buoy, W. $\frac{3}{4}$ S., distant $1\frac{3}{10}$ mile.

The foregoing buoys mark the west side of the Scroby and the eastern boundary of Cockle gatway and Caister road.

Scroby Elbow, a *chequered black* and *white* bell buoy, with staff and cage, lies in 6 fathoms; with the southernmost mill at Yarmouth in line with the middle of Britannia pier-head, bearing S.W. $\frac{3}{4}$ W.; Caister Elbow buoy, N. by W., distant $1\frac{1}{10}$ mile; and South Caister buoy, W. by N. $\frac{3}{4}$ N., 7 cables.

S.W. Scroby, a *chequered black* and *white* can, lies in $8\frac{1}{4}$ fathoms; with St. Peter church, just opening southward of the southern look-out at Yarmouth, bearing W. by N., northerly; and St. Nicholas light-vessel, S.S.W. $\frac{1}{4}$ W., distant $1\frac{3}{10}$ mile.

Scroby South Elbow, conical buoy, *chequered black* and *white*, lies in 10 fathoms; with the highest mill at Southtown, its breadth westward of St. Peter's church, Yarmouth, bearing N.W., northerly; S.W. Scroby buoy, N. by E. $\frac{3}{4}$ E., distant one mile; St. Nicholas light-vessel, S.W. $\frac{1}{2}$ S., $3\frac{1}{2}$ cables.

The last three buoys mark the eastern boundary of Yarmouth road.

South Scroby Spit, a can buoy, *chequered black* and *white*, in 25 feet; with North Corton buoy, S.W. $\frac{1}{4}$ S., $2\frac{3}{4}$ cables; Scroby Hook buoy, S. by E. $\frac{1}{2}$ E., $\frac{3}{4}$ mile; and St. Nicholas light-vessel, N.N.W. $\frac{1}{2}$ W., 7 cables.

Scroby Hook, a cylinder, *chequered black* and *white*, lies in $4\frac{1}{2}$ fathoms; with the cupola of St. George chapel, Yarmouth, open eastward of Wellington pier, bearing N.N.W. $\frac{1}{4}$ W.; N.E. Corton buoy, S.S.W. $\frac{3}{4}$ W., distant 6 cables.

South Scroby, a conical buoy of the largest size, *striped horizontally black* and *white*, and bearing a staff and a triangle with its base uppermost, lies in $6\frac{1}{2}$ fathoms; with Gorleston church twice its length northward of the north pier-head of Yarmouth haven, bearing N.W. $\frac{1}{4}$ N.; Kessingland church, open westward of Lowestoft low light cottages, S.W. $\frac{1}{4}$ S.; Corton light-vessel, S. by E., distant $1\frac{1}{2}$ mile; S.E. Corton buoy, W. by S., $\frac{6}{10}$ mile; N.E. Corton buoy, N.W. $\frac{1}{4}$ N., $\frac{8}{10}$ mile; North Corton buoy, N.N.W., $1\frac{9}{10}$ mile; St. Nicholas light-vessel, N. by W. $\frac{1}{2}$ W. westerly, $2\frac{6}{10}$ miles; and South Cross sand buoy, N.E. by E. $\frac{3}{4}$ E., $2\frac{1}{2}$ miles.

The last three buoys mark the north-east boundary of Hewett channel.

NEWARP and NEWARP RIDGE, to the north-eastward of the Scroby, constitute the south-western boundary of Hasborough gatway. From a depth of 10 fathoms at their northern extremity, Winterton lighthouse bears W. by S. $\frac{3}{4}$ S., distant 7 miles; Hasborough high lighthouse, open to the north of the low lighthouse, N.W. by W. $\frac{1}{3}$ W., $11\frac{3}{4}$ miles; and the South buoy of Hasborough sand, N. by E., nearly 4 miles. The Newarp (proper) is a small 6-fathoms patch towards the north extremity of the ridge. Newarp ridge, about one-third mile broad, with 8 to 10 fathoms upon it, extends S. by W. for $2\frac{1}{2}$ miles, and joins the north part of Cross sand.

NEWARP LIGHT-VESSEL, placed in 1790, both to mark the position of Newarp shoal, and to serve as a mark through Hasborough gatway, has one *revolving white* light, showing *three flashes* in quick succession, followed by an eclipse of *thirty-six seconds*, the whole revolution occupying *one minute*; it is elevated 36 feet above the sea, and may be seen 10 miles off in clear weather.

Fog Signal.—A fog-horn is sounded in thick weather, giving *three* blasts in quick succession *every two minutes*, and should accident occur to the apparatus the gong will be substituted until repairs are effected.

The three masts, each carrying a ball, have been retained in this vessel, to distinguish her by day. The ball at the mizen is 6 feet lower than that at the foremast head. She is moored in 17 fathoms, S.S.E. $\frac{1}{2}$ E., $1\frac{3}{4}$ mile from the Newarp, with Hasborough lighthouses in line, bearing

N.W. $\frac{3}{4}$ W.; Martham church, open to the northward of Winterton church three times the apparent length of the latter, W. $\frac{1}{3}$ N.; and Gorleston church, open to the westward of Nelson monument, S.W. $\frac{1}{2}$ W.* The distance at which this vessel should be passed has been given on page 163.

CROSS SAND, the outermost of the shoals abreast Yarmouth, is separated from the Scroby by a deep and unsafe channel, named Barley Picle. Commencing at the south end of Newarp ridge, with which it is connected, it extends 9$\frac{1}{2}$ miles in a general S.S.W. and S.W. by S. direction, its southern extremity nearly joining the tail or elbow at the south end of the Scroby. The northern end of the sand has 23 feet on it; near the middle of the shoal is a patch which dries; there are also other patches of 17 and 18 feet towards its south-west end; with these exceptions, however, the prevailing depths upon Cross sand are 4 to 7 fathoms; its greatest breadth is 1$\frac{1}{2}$ mile.

BUOYS.—The outer or eastern side of Cross sand is thus marked:—

North Cross Sand, *black* conical buoy, with staff and globe, is more than one and a half mile to the eastward of 23 feet on North Cross sand. This buoy lies in 12 fathoms, with Winterton lighthouse bearing W $\frac{3}{4}$ N.; Newarp light-vessel, N. by E. $\frac{1}{4}$ E., easterly, distant one mile; and North-east Cross sand buoy, S. by W. $\frac{1}{4}$ W., westerly, $2\frac{3}{10}$ miles.

N.E. Cross Sand, a 13-feet conical buoy, *black*, with staff and St. Andrew cross, lies in 17 fathoms; with Winterton lighthouse bearing N.W. by W. $\frac{3}{4}$ W. northerly; St. Nicholas church, Yarmouth, W.S.W., westerly; and East Cross sand buoy, S. by W. $\frac{1}{4}$ W. westerly, distant 2$\frac{1}{4}$ miles.

East Cross Sand, a *black* conical buoy, lies in 21 fathoms; with Winterton lighthouse bearing N.W. $\frac{1}{4}$ W.; St. Nicholas church, Yarmouth, W. $\frac{1}{2}$ S.; and Middle Cross sand buoy, S.S.W. $\frac{1}{2}$ W., 2$\frac{1}{2}$ miles.

Middle Cross Sand, *black* conical buoy, surmounted by two globes placed vertically, is in 18 fathoms; with Hemesby church, in line with a cluster of houses on the cliff, bearing N.W. $\frac{3}{4}$ N.; and the Roman Catholic church, at Yarmouth, in line with the highest mill at Southtown, W. by N.; East Cross sand buoy, N.N.E. $\frac{1}{2}$ E., distant 2$\frac{1}{2}$ miles.

South Cross Sand, *black* conical buoy, lies in 13$\frac{1}{2}$ fathoms; with St. Nicholas church, in line with Britannia pier-head at Yarmouth, bearing N.W. $\frac{1}{4}$ W.; Ormesby church, its length westward of Caister look-out, N.N.W. $\frac{1}{2}$ W.; Corton mill, just open south of a wood, W.S.W.; Corton light-vessel, S. W. $\frac{3}{4}$ S., distant $3\frac{3}{10}$ miles; and Middle Cross sand buoy, N.E. $\frac{1}{2}$ N., $2\frac{7}{10}$ miles.

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* *See* regulations respecting light-vessels, footnote, page 101.

CORTON SAND, has its north end in 3 fathoms abreast Yarmouth haven, and 6 cables to the north-west of Scroby Hook buoy; this portion of it was formerly a distinct shoal and known as St. Nicholas bank, hence the name of the light-vessel to the northward. The Corton, which is irregular in form, is $4\frac{1}{2}$ miles long in a north and south direction, and about $\frac{3}{4}$ mile wide. The least water on it, 3 feet, is about 6 cables to south-east of S.W. Corton buoy.

ST. NICHOLAS LIGHT-VESSEL, for marking the passage through Hewett channel, lies in 10 fathoms, $\frac{8}{10}$ of a mile within the north end of Corton sand. The principal light is *white, fixed,* 36 feet above the water, and may be seen at the distance of 10 miles in clear weather; there is also a *red* distinguishing light *flashing every ten seconds* shown at a height of 16 feet from near the stern of the vessel.

Fog Signal.—A gong is sounded during thick or foggy weather.*

From the vessel, St. Nicholas church tower is its breadth westward of the Roman Catholic chapel at Yarmouth, bearing N.N.W. $\frac{1}{4}$ W.; Gorleston church tower is in line with the south end of the petroleum store on Yarmouth south denes, W. $\frac{3}{4}$ N.; S.W. Scroby buoy bears N.N.E. $\frac{1}{4}$ E., distant $1\frac{3}{10}$ mile; and North Bank buoy, W. by S., $\frac{9}{10}$ mile.

CORTON LIGHT-VESSEL, for assisting in the navigation of Hewett channel, and to keep vessels to the eastward of the sands, lies one mile outside Corton sand, in $12\frac{1}{2}$ fathoms; she exhibits a *revolving red* light, which shows a *flash every twenty seconds,* at 37 feet above the water, and is visible at the distance of 10 miles in clear weather; she carries a half-ball under the usual ball at her mast-head.

Fog Signal.—A gong is sounded during thick or foggy weather.*

From the vessel, Gorleston church tower is its breadth westward of the lighthouse on the south pier-head at Yarmouth haven, bearing N.W. by N.; St. John's church is in line with Lowestoft low light-house, S.W. by W. $\frac{1}{2}$ W.; South Cross Sand buoy bears N.E. $\frac{3}{4}$ N., distant $3\frac{3}{10}$ miles; East Barnard buoy, S.W. $\frac{3}{4}$ S., $7\frac{6}{10}$ miles; S.E. Corton buoy, N.N.W. $\frac{3}{4}$ W., $1\frac{1}{2}$ mile; and St. Nicholas light-vessel, N. by W. $\frac{1}{2}$ W., $4\frac{2}{10}$ miles.

BUOYS.—Corton sand is marked by six buoys as follows: the first four being on the outer or eastern side of the sand; the remainder on the west side.

North Corton, conical, *striped horizontally black* and *white,* with staff and diamond, lies in 19 feet; with the southernmost of three remarkable trees, open northward of Yarmouth haven north pier-head, bearing

* *See* regulations respecting light-vessels, footnote, page 101.

W.N.W., westerly; St. Nicholas light-vessel, N. by W., $\frac{5}{10}$ mile; and N.W. Corton buoy, S.S.W., $1\frac{5}{10}$ mile.

N.E. Corton, *black* can, in 4 fathoms; with Hopton old church, in line with a round-topped tree near the north end of Herringfleet wood, bearing W. $\frac{1}{2}$ S.; Lacon's brewery chimney, just open east of Wellington pier, N. by W. $\frac{3}{4}$ W.; North Corton buoy, N. $\frac{1}{2}$ W., distant $1\frac{1}{10}$ mile; Scroby Hook buoy, N.N.E. $\frac{3}{4}$ E., $\frac{5}{10}$ mile; South-east Corton buoy, S. $\frac{1}{2}$ E., $\frac{8}{10}$ mile.

S.E. Corton, *black* can, in 5 fathoms; with Gorleston church, just open east of south pier-head at Yarmouth haven, bearing N.W. by N.; a single tree southward of a wood near Lound, in line with the chimneys of some cottages near the cliff, W. by N. $\frac{3}{4}$ N.; South Corton buoy, S. $\frac{1}{2}$ E., distant $1\frac{1}{2}$ mile; Corton light-vessel, S.S.E. $\frac{3}{4}$ E., $1\frac{5}{10}$ mile; South Scroby buoy, E. by N. $\frac{5}{10}$ mile; and Scroby Hook buoy, N. by E. $\frac{1}{2}$ E., $1\frac{4}{10}$ mile.

South Corton, a *black* can, lies in $5\frac{1}{2}$ fathoms; with St. Nicholas church, just open eastward of Wellington pier-head, Yarmouth, bearing N. by W., westerly; Corton church tower, its length southward of the northernmost houses at Corton, W. by N. $\frac{3}{4}$ N.; and Kirkley church tower, its breadth westward of the gas-house chimney at Lowestoft, S.W. by W.; S.E. Corton buoy, N. $\frac{1}{4}$ W., distant $1\frac{1}{2}$ mile.

N.W. Corton, *chequered black* and *white* can, in $6\frac{1}{2}$ fathoms; with Gorleston church tower, its length westward of Gorleston south pier lighthouse, bearing N.W. by N., northerly; S.W. Corton buoy, S.S.W., distant $1\frac{3}{10}$ mile; and S.E. Corton buoy, S.E. by S., one mile.

S.W. Corton, a *chequered black* and *white* can, lies in 7 fathoms; with Hopton old church, its length northward of the new church, bearing N.W. by W. $\frac{1}{4}$ W.; Southtown highest mill, midway between the old and new gas chimneys, N. $\frac{1}{2}$ W.; North Holm buoy, S.S.W. $\frac{1}{4}$ W., distant $1\frac{4}{10}$ mile; and N.W. Corton buoy, N.N.E., $1\frac{2}{10}$ mile.

YARMOUTH ROAD, the most important anchorage on the eastern coast of England, is 6 miles long and one mile wide, a space sufficient for the accommodation of a numerous fleet; from 1,000 to 1,500 sail of colliers and other vessels are occasionally at anchor in it. The bottom is a mixture of sand, mud, and stones, and a berth may be taken up in any part of the road with nearly equal safety.

In strong easterly winds, a better anchorage will be found under the high part of Holm sand abreast Lowestoft-ness.

The accidents that occur in Yarmouth road usually result from one or more of the following causes:—Being anchored too close in; riding with too short a scope of cable; being badly found in ground tackling, or

neglecting to adopt the common precaution of striking yards and masts on the occurrence of heavy weather. From these combined causes, 25 sail were driven ashore during a north-easterly gale in 1836.

Two Life-Boats, and an ample supply of apparatus for saving life, are constantly kept in readiness near the jetty.

COCKLE GATWAY,* between the Cockle to the westward and the Scroby to the eastward, is 3 miles long and half a mile wide.

Directions.—Having arrived abreast Winterton, keep Cockle light-vessel bearing S. ¾ W. while closing her, and having passed on the west side of her, keep her bearing N.N.E. northerly, and this will direct through the gatway into Yarmouth road, with the *black* buoys on Cockle and Caister shoals to the westward, and the *black* and *white chequered* buoys of the Scroby to the eastward.

If approaching from the direction of Hasborough gatway, keep Newarp light-vessel bearing East, until Cockle light-vessel is S. ¾ W., and then proceed as before directed.

Working in, it must be borne in mind that Cockle and Caister shoals are steep-to. The North Scroby may be closed by the lead, or until Nelson monument is in line with the head of Wellington pier, bearing S.W. by S.

By Night, close Cockle light upon a S. ¾ W. bearing; pass one cable to the westward of the vessel, and then keep the light bearing N.N.E. northerly, the directing mark through the gatway; it must on no account be brought to the northward of N. by E. ¾ E. on the flood, until well through the passage, nor to the eastward of N.N.E. ¼ E. during the ebb. The two *fixed red* lights at Yarmouth kept in line, S.W. ½ S., leads two cables clear of Caister Elbow.

CAUTION.—The tide-streams in Cockle gatway are rapid and cross, that of the flood setting strongly upon the Scroby, and that of the ebb upon Cockle and Caister shoals. Many vessels have been lost upon the sands on either side from not paying sufficient attention to the set of the tide-streams, and the bearing of Cockle light-vessel.

The directions in continuation to the southward past Lowestoft, &c., are on page 186.

HEMESBY HOLE, or Nelson gatway,* the channel inshore of Cockle and Caister shoals, though subject to constant change, is, when available, much used by vessels of light draught in scant north-westerly and south-westerly winds, as they thereby avoid the longer round through Cockle gatway. This passage, which is one mile wide near Winterton, becomes gradually contracted to the southward, and the outlet is either through a swashway between Cockle and Caister shoals, or between the

* **Caution.**—*See* footnote, page 167.

latter and Caister point. West Cockle Spit buoy (*red* and *white vertical* stripes) marks the south-west part of the Cockle, which is steep-to. The depths in the Hole, and of the outlet or swashway, vary according to circumstances; in the former from 9 to 6 fathoms, the latter from 14 to 18 feet.

As the channel runs nearly parallel to the main, no good mark can be given for it, but the frequent changes to which it is subject render this the less necessary. The most available passage over the sands is between Cockle and Caister shoals. After Winterton-ness has been passed, keep 4 or 5 cables off shore till Winterton mill appears in line with some farm buildings bearing N.N.W. $\frac{1}{2}$ W.; this mark will lead through the swashway, in a depth of 15 feet at low-water, into Cockle gatway.

OUTSIDE YARMOUTH SANDS.—Having rounded Newarp light-vessel, keep her bearing North until Winterton lighthouse appears to the northward of N.W., when the coasting course S.S.W. $\frac{3}{4}$ W. (or more southerly if the ebb be running), will lead outside Cross sand, and of all the other dangers abreast Yarmouth and Lowestoft.*

With the exception of an 8-fathoms patch $1\frac{1}{2}$ mile long, extending S.S.E. from near Newarp light-vessel, the prevailing depths outside the Newarp and Cross sand are from 11 to 14 fathoms, and the ground is uneven, but a deep gully with 20 to 22 fathoms in it occurs one mile outside the shoals from abreast Newarp light-vessel to abreast the south end of Cross sand,—a useful feature while working in this vicinity in misty weather.

HEWETT CHANNEL,† the principal southern channel into Yarmouth road, lies in a N. by W. and S. by E. direction between the south part of the Scroby and the northern portion of Corton sand, and is only one-third of a mile wide at its narrowest part; it has decreased considerably in depth, and not more than 24 feet can be reckoned upon at low-water spring tides. The flood and ebb streams set fairly through it.

Directions.—Owing to its oblique direction with respect to the adjacent shore, no good leading-mark through it can be given. From a berth one-third of a mile to the south-west of the South Scroby buoy, a N. by W., northerly, course for $2\frac{3}{4}$ miles will lead through the channel and to the eastward of St. Nicholas light-vessel.

At night, from a short distance westward of Corton light-vessel, steer N. by W. $\frac{1}{4}$ W. towards St. Nicholas light-vessel, and the same course

* **Caution.**—Considerable alterations having taken place in Cross sand, it would be dangerous to pass westward of the buoys marking it, until within a short distance of Newarp light-vessel.—8th *September* 1880.

† **Caution.**—*See* footnote, page 167.

continued after she has been passed will conduct to an anchorage in Yarmouth road, or a more northerly one towards Cockle gatway. While abreast South Scroby sand, do not bring St. Nicholas light to the westward of S. by W. $\frac{3}{4}$ W.

TIDES.—It is high-water, full and change, in Yarmouth road, at 9h. 15m., but the flood-stream continues to run to the southward till 10h. 30m. Outside the sands it runs for 1$\frac{1}{2}$ hour longer. Springs rise 6 feet, neaps 4$\frac{1}{2}$ feet, and neaps range 3 feet.

The flood-stream being deflected past the entrance of Yarmouth haven by the projection of the North bank and pier, enters the harbour as an eddy from the southward and south-westward, except during strong north-easterly winds and high tides, when it sets directly across the entrance towards the south pier. Common springs rise at the Brush 5$\frac{3}{4}$ feet, and neaps 4$\frac{1}{4}$ feet. At Yarmouth bridge springs rise 5 feet, and neaps 4 feet, the difference between the times of high-water at these places being about 20 minutes. The flow, however, as in the case of all the harbours upon this coast, is greatly influenced by local causes—thus, a north-westerly gale has caused a rise of 12$\frac{3}{4}$ feet at the Brush, and a sudden change of wind has sometimes made a difference in a succeeding high-water of 3 or 4 feet. During freshes, the rate of the stream at the Brush is occasionally 6 knots, but on common springs it is 3$\frac{1}{2}$ and 4 knots per hour. The tide flows 32 miles up the Yare to the mill-dam at Norwich, 28 miles up the Waveney to the lock above Beccles, and 36 miles up the Bure to the lock at Caltishall.

The COAST, from Corton to Southwold, is a nearly continuous line of cliffs, composed of sand, gravel, and red loam.

Corton stands a short distance back from the cliff; the church (partly in ruins) at the north end of the village is a prominent object; and several handsome villas have been erected to the southward.



Corton church, S.W., 1 mile.

CORTON GATWAY,* the narrow channel between Corton and Holm sands, had in 1881 a depth of 15 feet at low-water, but it is not buoyed.

A Life-Boat and rockets are maintained at Corton.

LOWESTOFT.—Beach begins to project from the foot of the cliff abreast Corton, forming at a distance of 2 miles to the southward the low promontory Lowestoft-ness, which is the easternmost point of England.

* **Caution.**—*See* footnote, page 167.

The town of Lowestoft, upon the summit and slopes of a steep bank, with much wood about it, shows prominently from every point of view. Its church, in the later English style, with a low tower and a slender spire, is situated half a mile inland of the town. It is said that at the period this inconvenient position was chosen the sea was making rapid encroachments on the coast; the reverse, however, is now the case in this immediate neighbourhood, a broad sandy flat having gradually formed in front of the cliff. A suburb, with a handsome spire-church and several terraces fronting the sea, has been formed of late years on the south side of the harbour.

The imports consist of wood, coal, linseed, and general goods, besides which cattle, sheep, &c., are annually imported from the continent. The exports are fish, corn, malt, &c. On the 1st January 1881, the registered shipping of the port was 444 vessels of 17,961 tons; and the arrivals in 1880, 640 vessels of 88,393 tons. Population, 19,597 in 1881.

LIGHTS.—Lowestoft has been an important light-station from the beginning of the seventeenth century. The high lighthouse, built in 1609 and rebuilt in 1676, is on the brink of the cliff at the north end of the town, but it is partly hidden by trees; from it is exhibited a *revolving white* light, showing a *flash* at intervals of *thirty seconds*, at an elevation of 123 feet above the level of high-water; a *fixed red* light, visible between the bearings S.W. and S.W. by S., is shown 24 feet below the *white* light. The low lighthouse, consisting of a lantern supported on an iron framework, stands on the beach at the ness S. 27° E., 887 yards from the high lighthouse; the light shown from it is an *occulting* light, that is to say, once in *every half minute* it suddenly disappears for *three seconds*, and then, as suddenly, re-appears at full power; it shows *red* seaward between the bearings S.S.W. and N.E. by N., and *white* inshore of those bearings, and it is 40 feet above high-water. Both structures are painted white, and the lights may be seen in clear weather at the respective distances of 16 and 11 miles.



Lowestoft High lighthouse.

Fog Signal.—In thick or foggy weather, a bell is sounded from the low lighthouse *three* times in quick succession *every quarter-minute*.

Vessels from across the North sea generally prefer making the land about Lowestoft, as the soundings are regular, the offing is clear of out-

lying dangers, and the high land by day and the lights by night render it easily distinguishable.

Harbour.—Lowestoft harbour, an entirely artificial work, was originally intended to effect a direct communication between Norwich and the sea; lake Lothing, a tributary of the Waveney, with a surface extent of 1,300 acres, which approached within 400 yards of the sea, having been connected with the latter by a cut which was made in 1830, and fitted with piers, gates, and sluices; a channel was also dredged through lake Lothing up to Mutford bridge. These works were completed in 1832, at an expense of 150,000*l.*, one-third of which sum was obtained from the Exchequer Loan Commissioners.

The harbour was used for several years, but owing to the admission and retention of sea water in lake Lothing, it rapidly diminished in depth from deposit; the sluice gates were rendered useless by the ravages of the sea worm (*teredo navalis*), the quays and embankments fell in masses and were washed away, and the entrance into the harbour became blocked up by a bar of shingle and sand. In 1841, the revenue of the port not being sufficient to meet the current expenses, it was taken possession of and sold by the Exchequer Loan Commissioners, and after passing through several hands, it ultimately became the property of the Great Eastern Railway Company.

In 1845, while in possession of Sir Samuel Peto, the old works, with the exception of the sluice gates, were repaired, and a new harbour on a large scale was constructed outside of, and in continuation of, the old one. It consists of two piers of open piling filled in with stones, which project into the South road, and enclose a space of 18 acres; the entrance is 150 feet wide, and faces south-east. Owing to the close nature of the harbour, it is subject to the deposit of matter brought in by the sea from the movable sands in its vicinity; but a channel from the sea to the inner harbour, with 10 feet in it at low-water, is generally maintained by dredging.

There is a dry dock, 241½ feet in length, with 46½ feet width of entrance, which has received a steamer of 1,000 tons; and also a patent slip, capable of taking up a vessel of 200 tons. The Great Eastern Railway Company has saw mills on the north wharf, above the bridge.

There are two fish markets on the north side of the outer harbour.

Lights.— Each pier-head of the outer harbour is marked by a light-house, from which a *fixed red* light is shown all night, that on the north pier is obscured in-shore of the bearing S.W. by W. ½ W. Two *green* lights are also shown at the entrance of the inner harbour. When the navigation is obstructed, a *red* light is shown from the centre of the bridge by night, and a *red* flag by day from the lock-wall. A *green* light is shown from the

centre of the bridge when it is closed, and a bright light from the lock-wall when the bridge is open and the navigation is clear. No vessel is to approach until this *bright* light is shown.

Signals.—The depth of water between the outer pier-heads varies to such an extent that the following signals have been established.

By day.—A *red* flag will be hoisted at the old fish market look-out when the depth at the entrance of the harbour is 10 feet and upwards; and a *black* ball when there is less than 10 feet.

By night.—A *red* light on the look-out will indicate a depth of 10 feet or more, and a *green* light when there is less than 10 feet at the entrance.

The harbour service is conducted by a body of pilots, and steam tugs are commonly employed, their charge being according to a regulated scale of prices. Vessels bound into the harbour and requiring a steam tug should hoist a flag or burgee at the masthead by day, and two lights where best seen by night. A single light is the night signal for a pilot. A dredger, for which vessels should look out, is often at work in the entrance.

A Life-Boat, and also rockets and lines, are maintained here.

In the vicinity of Lowestoft harbour the land is low, but cliff begins again half a mile beyond it, and Kirkley church stands prominently a short distance back.

PAKEFIELD.—The fishing village of Pakefield is on the brink of the cliff one mile to the southward of Lowestoft harbour, several villas adjoining it to the northward; its church and windmill are the principal objects, but, from standing on lower ground than the village, they are not very prominent.

Life-Boats.—Two life-boats are stationed at Pakefield.

Pakefield lighthouse, built in 1832 for leading through Pakefield gatway, is one mile to the south-west of the village at the head of a deep score in the cliff named Wilkinson's hole. Being only 33 feet high, it is not a plain object from the sea, but there is more wood about it than elsewhere in the neighbourhood, and its position may be recognised by this feature. On account of the changes which have occurred in Pakefield gatway, the light from this building has been superseded by one at Kessingland fish-houses.



Pakefield disused lighthouse.

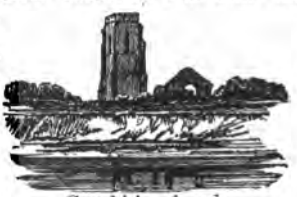
KESSINGLAND.—The cliff continues of a nearly uniform height from Kirkley to Kessingland fish-houses, a cluster of red-tiled cottages

near the beach. The village of Kessingland is ¾ mile back from the cliff, and has much wood about it; its church, one of the principal objects on the coast, is a plain building with a lofty square tower, its size showing that Kessingland was formerly a place of more importance than it is at present.

LIGHT.—A *fixed red* light, for leading through Pakefield gatway, and visible between the bearings W. ½ S. and N.W. ½ W., is shown, at 68 feet above high-water, from a white shed on the cliff at the north end of Kessingland fish-houses.

Life-Boats.—Two life-boats, and a rocket apparatus, are stationed at Kessingland.

COVEHITHE-NESS.—A shingle beach succeeds the cliff at Kessingland fish-houses, and, at the distance of nearly 2 miles, forms the low point Covehithe-ness. The back-ground in this district is slightly undulated and well wooded, with no remarkable objects, but a thick compact grove stands close to the beach at Covehithe-ness, by which it may be readily known. Covehithe church, with its ivy-covered ruined chancel, is prominent a short distance in the rear.



Covehithe church, N.W. by W., 1 mile.

A Rocket apparatus is stationed at Covehithe.

Low cliff extends for one mile from Covehithe-ness to Easton broad or lake which has a wooded margin; thence succeeds Easton-ness, a low cliff. The sea has made great ravages here, for, according to tradition, the easternmost point of England and the city of Easton Bavent formerly occupied a site abreast, which is now two miles from the land.

Beyond Easton-ness, a low shingle beach extends to Southwold.

LOWESTOFT SANDS AND ROADS.

Shoals, in continuation of those abreast Yarmouth, lie off the whole of the coast just described.

HOLM SAND is separated from Corton sand by Corton gatway, and commences as a narrow spit projecting into Corton road, to about one mile from Corton church, and from this spit the inner or western side of the sand gradually bends S.S.E. and southerly for 2 miles, and then curves S.W. by S. for two miles to its south-western extremity. Across the body of the sand the breadth is three-quarters of a mile, but it gradually becomes very narrow to the south-westward. It is shoal and steep-to throughout, and one portion half a mile long, abreast Lowestoft-

ness, dries at low-water. Between the North Holm and Lowestoft-ness is Lowestoft North road.

BUOYS.—On the east side of the Holm are the—

East Holm, *black* can, in 11 fathoms; with Corton church, its length northward of the highest house in Corton village, bearing S.W. ¼ W., westerly; Corton light-vessel, S.S.E. ¼ E. distant 1⅝ mile; and Middle Holm buoy, S.W. ½ S., southerly, 1⅞ mile.

Middle Holm, a *black* can, in 6¾ fathoms; with Corton church in line with a large red-tiled house, bearing S.S.W.; Lowestoft low light-house, appearing midway between the church and town-hall, S.W. by W.; Kirkley mill, its length southward of Lowestoft pier, W. by S.; Corton light-vessel, S.E. ¾ S., distant 2⅛ miles; and South Holm buoy, S.W., westerly, one mile.

South Holm, a conical buoy, *striped horizontally black and white,* with staff and cross, lies in 6½ fathoms; with Corton church, in line with the east side of the life-boat house, bearing N. ¼ W.; Pakefield church tower, its length southward of Pakefield mill, W. ½ N.; and East Newcome buoy, S.W. ½ S., distant 6 cables.

On the west and north-west sides of the shoal [beginning from the *northward*] *are*—

North Holm, *chequered black and white* can, in 5 fathoms, 2 cables to southward of the end of the spit in Corton road; with Gorleston church and south mill in line, bearing N. ¼ W.; Lowestoft low lighthouse, S.S.W. ½ W., distant $1\frac{7}{10}$ mile; Holm End buoy, S.E. ¼ S., 6 cables.

Holm End, *chequered black and white* can, in 6 fathoms; with a remarkable gap in a wood in line with Corton life-boat house, bearing N.W. by W. ½ W.; Kirkley church, just open southward of St. John's church, S.W. ¾ W.; North Holm buoy, N.W. ¼ N., distant $\frac{6}{10}$ mile; and N.W. Holm buoy, S. ½ W., one mile.

N.W. Holm, *chequered black and white* can, in 11½ fathoms; with Lowestoft church and high lighthouse in one, bearing W. by N. ½ N.; Kirkley church, just open northward of the south pier harbour lighthouse at Lowestoft, W. by S. ¾ S.; North Holm buoy, N. ¾ W., distant $1\frac{4}{10}$ mile; Holm End buoy, N. ½ E., one mile; and West Holm buoy, S.S.W., $\frac{8}{10}$ mile.

West Holm, *chequered black and white* can, in 8 fathoms; with Lowestoft mill, in line with the town-hall clock turret, bearing N.W.; St John's church, in line with the north pier-head lighthouse at Lowestoft, W. by N. ½ N.; N.E. Newcome buoy, S.W. ¼ W., distant half a mile; and North Newcome spit buoy, N. by W., $\frac{6}{10}$ mile.

S.W. Holm, a can, *chequered black* and *white,* in 5½ fathoms ; with Corton church, in line with the life-boat house, bearing N. ¾ W. ; Pakefield church, just open southward of the life-boat house, W. ½ S. ; South Holm buoy, S. by E. ¾ E., distant 3 cables.

INNER SHOAL is in-shore between Lowestoft-ness and the harbour ; the shape of it is irregular and subject to constant change, and the shoal has latterly become broken up, the least depth on it at present being 15 feet.

Buoy.—The inner part of Inner shoal is marked by a *red* and *white vertically striped* can, in 3 fathoms ; with Lowestoft low lighthouse bearing N. ¾ E., distant 4 cables ; North Newcome spit buoy, E. by N., 7 cables ; and North Newcome buoy, S.W. ½ S., 4 cables.

NEWCOME SAND is within the south-west part of the Holm ; it begins close abreast Inner shoal, and ends abreast Kessingland, forming the south-eastern defence of Lowestoft South road, and Pakefield road, and the north-western boundary of Stanford channel. The shoal is about 4½ miles long and ⅔ mile broad ; the general depths over it are from 7 to 15 feet, but there is as little as 3 feet over one portion of it.

BUOYS.—The western side of the Newcome, which is steep-to and slightly convex, is thus marked :—

North Newcome, a *red* and *white vertically striped* can, in 4½ fathoms ; with the spire of St. John's church, in line with the north end of the Royal hotel, bearing N.W. ½ W. ; and Lowestoft old low lighthouse, one-third the distance from the high lighthouse towards the gas-house chimney, N. ½ E. ; N.W. Newcome, S.W. ¾ S., distant $\frac{9}{10}$ mile ; and Inner shoal buoy, N.E. ½ N., 4 cables.

N.W. Newcome, a *red* and *white vertically striped* can, in 4¾ fathoms ; with Pakefield mill, just open to the westward of Pakefield church, bearing W. ½ N. ; and the spires of Lowestoft and St. John's churches in line, N. ½ E. ; West Newcome buoy, S.W. ¾ S., distant $\frac{8}{10}$ mile ; and North Newcome buoy, N.E. ¾ N., $\frac{9}{10}$ mile.

West Newcome, a *red* and *white vertically striped* can, in 5 fathoms ; with Pakefield lighthouse, between the second and third from the south of six remarkable trees, bearing W. ½ S. ; and Pakefield mill, touching the south side of Pakefield barn, N.N.W. ¾ W. ; S.W. Newcome buoy, S. by W. ¾ W., distant 7 cables.

S.W. Newcome, a *red* and *white vertically striped* can, in 3¾ fathoms ; with a tall factory chimney, just open east of Pakefield barn,

bearing N. ¼ W. westerly; four remarkable trees midway between Kessingland church and the old coast-guard houses, W. by S. ½ S.; and West Newcome buoy, N. by E. ¼ E., distant $\frac{7}{10}$ mile.

South Newcome, *red* and *white horizontally striped* conical buoy, with staff and triangle, in 3 fathoms, marking Pakefield gatway; lies with a tall factory chimney, its length westward of Pakefield mill, bearing North; Kessingland lighthouse, W. ¼ S., distant $\frac{7}{10}$ mile; and West Barnard buoy, S.W. ¼ S., $1\frac{7}{10}$ mile.

On the south-eastern side of the sand, which forms the north-west boundary of Stanford channel, are—

North Newcome Spit, a *black* and *white horizontally striped* conical buoy, with staff and diamond, in $5\frac{1}{2}$ fathoms; with Corton mill, just open westward of Corton hall, bearing N. by W. ¼ W.; Kirkley mill, its length open northward of the look-out at the east end of the fish wharf at Lowestoft, W. ½ S.; Inner shoal buoy, W. by S. ½ S., distant 6 cables; North Holm buoy, N. ¼ E., $2\frac{1}{10}$ miles; N.W. Holm buoy, N.E. ¼ E., 5 cables; West Holm buoy, S. by E., 6 cables.

N.E. Newcome, a *black* conical buoy, in 7 fathoms; with Pakefield church, in line with a black building (red-tiled) next northward of the life-boat house, bearing W. ½ S.; North Newcome Spit buoy, N. by E. ½ E., distant 9 cables; S.W. Holm buoy, S.E. by E. ½ E., 2 cables.

East Newcome, a *black* conical buoy, in 7 fathoms, lies eastward of Holm Tail; with Lowestoft church, its length northward of the Wesleyan chapel spire, bearing N. by W. ¾ W.; Pakefield mill, on with the north side of a large house on the cliff southward of Pakefield, W. by N. ¾ N.; South Holm buoy, N.E. ½ N., distant $\frac{6}{10}$ mile; and S.E. Newcome buoy, S.W. ¾ S., distant $1\frac{7}{10}$ mile.

S.E. Newcome, a *black* can, lies in $5\frac{3}{4}$ fathoms; with Lowestoft church spire, just open westward of the Royal hotel, bearing North, easterly; a mill, just open north of Sea Row house, W. by S. ¼ S., southerly; East Barnard buoy, S.W. by S., distant $1\frac{7}{10}$ mile; and East Newcome buoy, N.E. ¾ N., $1\frac{7}{10}$ mile.

BARNARD.—This shoal is a continuation of the Newcome to the south-westward, Pakefield gatway being the deeper water over the south end of the Newcome before it rises into the Barnard; 11 feet upon the north-east part of it is S.E. by S. 1¼ mile from Kessingland fish-houses, from which depth, bending to the eastward, it extends S.W. by W. for 1½ mile, sending a shallow spur half a mile to the North from its centre; a narrow passage, Covehithe channel, lies between its western side and the

shore. The breadth of the shoal averages one-quarter of a mile, and the depths upon it are from 4 to 11 feet.*

BUOYS.—The outer or south-eastern side is marked by three buoys, namely :—

East Barnard, marking the southern boundary of Pakefield gatway, is a *red* conical buoy, with staff and ball, in 5½ fathoms; with Lowestoft mill, its length open eastward of St. John's church, bearing N. by E.; Kessingland church, in line with the southernmost of two white houses on the southern part of Kessingland cliff, N.W.; S.E. Barnard buoy, S.W. ¾ S., distant 9 cables; West Barnard buoy, W. ¼ S., distant $1\frac{1}{10}$ mile; Kessingland lighthouse, N.W. ½ W., 1½ mile; S.E. Newcome buoy, N.E. by N., $1\frac{2}{10}$ mile; South Holm buoy, N.E. by N., 3½ miles; Corton light-vessel, N.E. ¾ N., $7\frac{6}{10}$ miles.

S.E. Barnard, a *red* can buoy, lies in 6 fathoms; with Kessingland church, in line with the southernmost of three houses between Kessingland fish-houses and Sea Row, bearing N.N.W. ½ W.; Covehithe church, open southward of Benacre wood, W. ½ S.; South Barnard buoy, S.W. ½ W., westerly, distant 9 cables.

South Barnard, a *red* can, in 5 fathoms; with Kessingland church, its length on Benacre sluice, bearing N. ½ W., westerly; Covehithe church, its length southward of the coast-guard house and flagstaff on Covehithe-ness, W. by N., northerly; and Inner Barnard buoy, S.W. by W. ¾ W., distant one mile nearly.

Inner Barnard, a *black* and *white horizontally striped* conical buoy, with staff and diamond, in 3½ fathoms, at the south-west end of the sand; with the life-boat house near Covehithe-ness, its width eastward of Sea Row cottage, bearing N.N.E.; and a remarkable tree showing between Covehithe church tower and the ruin of the chancel, N.W. ¾ N.

The three following buoys define the swashway within the Barnard :—

S.W. Barnard, a can, *chequered black* and *white,* in 15 feet; with Kessingland lighthouse cottage, open eastward of Covehithe life-boat house, bearing N. by E. ¾ E.; Covehithe church, in line with the coast-guard hut on Covehithe-ness, W. by N. ¾ N.; and Inner Barnard buoy, South, westerly, distant 3½ cables.

West Barnard, a can, *chequered black* and *white,* in 4½ fathoms, at the north point of the Barnard; with Lowestoft church, just open eastward of the northernmost house at Pakefield, bearing N.N.E., northerly; Benacre church, in line with a cottage (with a tall chimney on it) southward of Benacre sluice, W.N.W.; Inner Barnard buoy, S.S.W. ¾ W.,

* *See* Admiralty chart, England, East coast, Pakefield gatway to Orfordness, No. 102; scale, mile = 1½ inch.

distant $1\frac{9}{10}$ mile; East Barnard buoy, E. ¼ N., $1\frac{1}{10}$ mile; South Newcome buoy, N.E. ¾ N., $1\frac{9}{10}$ mile; and Covehithe buoy, S.S.W. ¾ W., 8 cables.

Covehithe, a *black* can, in 3½ fathoms; with Lowestoft and Kirkley high mills in line, bearing N.N.E. easterly; West Barnard buoy, N.N.E. ¾ E., distant 8 cables; and S.W. Barnard buoy, S.W. ½ S., 6 cables.

Telegraph Cables.—A telegraph cable from Lowestoft-ness to Hanover extends from a short distance north-east of the low lighthouse in an E.N.E. direction across the North road, passing 3½ cables to the southward of Holm End buoy; and another cable to Zandvoort lies from the same point E. ¼ N. to about midway across the road, and then bends south-easterly.

LOWESTOFT ROADS afford better anchorage than that of Yarmouth in consequence of the greater protection they receive from their covering or outlying sands, but the space is confined. In Corton road the bottom consists of mud cars, blue clay, and mud; in Lowestoft North road, of blue clay and mud; in the South road, of mud and ooze; and in Pakefield road, of blue clay and mud. The best position in easterly gales is, as previously remarked (page 174), under Holm sand; during north-westerly gales in the South road; and in south-westerly gales in the North road.

Directions.—In proceeding from Yarmouth to Lowestoft roads there are no obstructions in the way; the shore is clean throughout, and the inner side of Corton and Holm sands is clearly marked by the buoys. From Lowestoft North road there are two passages to the southward to the open sea, the outer being Stanford channel, and the inner one thrugh Lowestoft South road and Pakefield gatway.

Directions for Stanford Channel.—Stanford channel,* between the south-west part of the Holm and the Newcome, opened out, in 1842, to the eastward of the position of a former channel of the same name, but since then it has gradually become narrower. Formerly it was available as a night passage, but the light-vessel that was used for the purpose was removed several years ago. In September, 1881, the depth had increased to 20 feet at low-water.

No leading mark can be given for it; proceed with the *horizontally striped black* and *white* buoy with diamond, and *black* buoy of the Newcome to the north-westward, and the *black* and *white chequered* buoys of the Holm to the south-eastward, until St. John's and Lowestoft church spires are in line, bearing N. ¼ E.; this mark leads in 20 feet at low-water, and, when an offing of 2 miles has been obtained, a S.W. by S. course for

* **Caution.**—*See* footnote, page 167.

20 miles will lead outside Sizewell bank, inside Aldborough Napes, and to a fair berth abreast Orfordness.*

The tide streams set rapidly but fairly through Stanford channel. In strong easterly winds, a vessel bound to the southward can readily pass out by Stanford channel, and have an offing when through.

Rounding Lowestoft-Ness by night.—The northern edge of the *red* light from Lowestoft low lighthouse, bearing S.S.W., clears the north-west extremity of Holm sand ; and the southern edge of the *red* light from the same lighthouse, bearing N.E. by N., clears the north-west side of the Newcome.

Approaching Lowestoft-ness from the direction of Yarmouth, and having passed the village of Corton, on opening the *red* light showing below Lowestoft high light, keep more southerly to open the *red* light from Lowestoft low lighthouse, and continue so until the *red* light on the north pier of Lowestoft harbour is seen, bearing S.W. by W. ½ W. The latter light kept in sight and closed till Lowestoft low light changes from *red* to *white* will lead round the ness and towards Lowestoft South road.

Directions for Pakefield Gatway.—Pakefield gatway, the shallow passage between the Newcome and the Barnard, has varied greatly of late years, and now only 12 feet at low-water springs can be depended on ;† the available channel, has, however, materially widened. It is often used in scant westerly winds by vessels proceeding both southward and northward.

Kessingland church bearing W.N.W., or the light-shed bearing W. by N. ½ N., is the day-mark for leading through it. In working, keep the light-shed between the bearings N.W. ½ W. and W. ½ S. The *red* and *white striped* buoys on the inner side of the Newcome clearly point out the south-eastern boundary of the channel to Lowestoft. The shore, as well as the Newcome, may be approached by the lead in working, but the latter is steep.

By night, the present leading mark through the gatway is Kessingland light bearing W. by N. ½ N.; if working, tack before the light becomes obscured upon a N.W. ½ W. or W. ½ S. bearing; and when the water deepens to 4 fathoms, the gatway will have been cleared, and in closing Lowestoft keep within the bright gleam from Lowestoft low lighthouse so as to avoid the Newcome. Passing through the gatway with

* The Admiralty chart of Yarmouth and Lowestoft roads, published in 1879, shows a New Channel across Holm Tail, with 16 to 17 feet depth.

† It has been observed that heavy southerly gales reduce the depth of water two or three feet below that shown by the chart in Pakefield and Covehithe channels. *See*, also, footnote, page 167.

south-easterly winds do not stand too far over towards the shore before edging away to the northward.

In proceeding out through Pakefield gatway by night, Kessingland light must be kept bearing W. by N. ¼ N. until a 2 miles offing has been obtained, when a S.W. by S. course for 20 miles will lead outside Sizewell bank, inside Aldborough Napes, and to a fair berth abreast Orfordness.

The Barnard is steep-to on the outside; therefore, while working abreast, go no nearer than into a depth of 10 fathoms, and at night keep Lowestoft high light in sight.

The south-west tail of the Barnard is to be cleared by keeping the tower of Southwold church over the south-west end of Easton cliff, bearing S.W. by W. ¼ W.

CAUTION.—In working near the Barnard, it must be borne in mind that the ebb stream sets within and strongly upon the south-west tail of the shoal.

COVEHITHE CHANNEL.—The alongshore passage, having its outlet between the south-west tail of the Barnard and Covehithe-ness, marked by the West, and S.W. Barnard, and Covehithe, buoys, had, in September, 1881, a depth of 13 feet: it is frequently used by small vessels in off-shore winds, but as the depth in it varies occasionally,* and it is also very narrow, it is only available for vessels of light draught.

TIDES.—It is high-water, full and change, at Lowestoft, at 9h. 57m.; springs rise 6½ feet, neaps 5¼ feet, and neaps range 4¼ feet. In the offing abreast Lowestoft, the flood stream during springs continues to run S.S.W. until one hour before high-water at Harwich.

SOUTHWOLD is seated on a hill of moderate height, which is nearly surrounded at high-water by the river Blyth, Buss creek, and the sea; the town is neatly built, and the houses facing seaward are of a superior description. The church, the principal object, built in 1460, and in excellent preservation, stands on the north side of the town; its size and commanding height render it one of the most striking objects on the coast. A black windmill on the common to the westward of the town is also a plain object.

Southwold rose on the decay of the neighbouring city of Dunwich, but it was nearly entirely destroyed by fire in 1659. The celebrated naval battle, known as Solebay sea-fight, was fought in front of it, and towards Dunwich, by the English and Dutch fleets in 1672.

* It has been observed that heavy southerly gales reduce the depth of water two or three feet below that shown by the chart in Pakefield and Covehithe channels. *See*, also, footnote, page 167.

LIGHTS.—Three *fixed white* lights are shown all night from gas-posts placed 100 yards apart, and at 40 feet above high-water, on the cliff at Southwold; they may be seen at the distance of 9 miles in clear weather.

Harbour.—The Blyth, which flows by Laxfield, Halesworth, and Blythburgh, and has its outlet half a mile to the southward of Southwold, constitutes its harbour. In the middle of the eleventh century, the Blyth discharged its waters at Dunwich, and formed a haven of the first maritime importance; but subsequent to the decay of that ancient city, the haven, owing to the movement of shingle and other causes, became choked from time to time, the river in each case forcing its way to the sea farther from Dunwich, and the present outlet was formed in 1590 by a cut made through the beach in continuation of the lower reach of the river.

In 1747, an Act was obtained for the improvement of the haven, under which the north pier was built in 1749, and a south pier in 1752; both have been since either rebuilt or extended. The length of the north pier is 367 feet, and that of the south pier 369 feet; they are built of wood, and are nearly parallel to each other; the entrance between them is 115 feet in width, and it faces S.E. Within the piers, the river has an increased breadth and depth for some distance, then it becomes tortuous and narrow: it is crossed by the first bridge at Buss creek, about one mile above the outlet. The evils under which the port laboured were not altogether removed by the erection of the piers; it still became choked on several occasions, even as late as 1839, when it was twice dug out; but since that period, by the application of steam dredging, and the removal of various obstructions, it has maintained a more permanent character.

Bar.—The bar, like the beach on either side of it, is composed chiefly of shingle, with a small proportion of sand, and its position and extent vary according to the prevailing wind; north-easterly winds having the effect of increasing it, those from the opposite direction reduce it; but in still weather the deep water track is generally in a south-easterly direction, straight out from between the piers. The height of the bar likewise fluctuates; sometimes it dries, and again there are several feet over it; but the average depth upon it at low-water springs may be assumed as $1\frac{1}{2}$ feet.

The maximum draught of the vessels using the port is 9 feet. They load and discharge at Walberswick and Blackshore quay, one-quarter and three-quarters of a mile, respectively, within the entrance. The cargoes for inland are discharged into river craft, and conveyed by them to Halesworth, 9 miles from the sea, and the principal corn market in the locality.

Population, 2,111 in 1881.

Supplies of every description are plentiful.

Life-Boats.—Southwold is a coast-guard station, and it establishes two life-boats, together with the usual apparatus for communicating with stranded vessels.

Pilots.—There are six harbour pilots, who attend when vessels are entering or are expected. The harbour may be taken in moderate weather when there is a sufficient depth over the bar, but it is dangerous to attempt it with the wind and sea directly on.

TIDES.—It is high-water, full and change, at the bar, at 10h. 20m. Ordinary springs rise 6¼ feet, and neaps 4¼ feet, over the river generally. The flow ceases at Bulcham lock at the mouth of Halesworth navigation, 6¾ miles from the sea, at which limit, the time of high-water is 50 minutes later than at the bar. The tide reaches to a level throughout. Particular winds, especially those from north-west, have the effect of raising the tides here as at the neighbouring ports.

Anchorage.—The shore abreast Southwold is clean, and there is good riding, in off-shore winds, one mile from the main, in from 7 to 9 fathoms, sand.*

The COAST.—From Southwold, shingle beach prevails for three miles to the south-westward; the village of Walberswick with its tower church stands a short distance within it, and the background is low and partially wooded.

DUNWICH.—Dunwich cliff, 50 feet high, ascends abruptly at the termination of the shingle beach to the south-west of Southwold, and continues for 1¾ mile to Minsmere head. At one-quarter of a mile from its northern extremity stands the picturesque ruin of the church of All Saints, consisting of the tower and portions of the walls of the nave and chancel. This is nearly all that remains of the former capital of East Anglia, which was the seat of a bishop in the seventh century, and at one time contained six parishes and fifty religious foundations, besides possessing a haven and numerous ships of war. The sea had made considerable encroachments upon the city at a period antecedent to the conquest, but the greatest destruction occurred between the thirteenth and seventeenth centuries, when streets, churches, and religious buildings fell in succession; in 1565 not a quarter of the city remained, and that portion of it has long since disappeared.

A Life-Boat is stationed at Dunwich, also rocket apparatus.

A Telegraph Cable extends from near the coast-guard station at Minsmere to Zandvoort.

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* See Admiralty chart, East coast of England, North Foreland to Orfordness, including the Entrance to the Thames, No. 1,610; scale, mile = 0·5 inch.

Rockets for effecting communication with stranded vessels are kept at Minsmere.

THORPNESS.—A coast-guard flagstaff stands upon Minsmere head, and a little within it there is a row of coast-guard houses; for 2 miles beyond, the coast consists of a low beach, with a few small windmills behind it; it then changes to a grassy bank with Sizewell coast-guard houses upon it, increasing in elevation to Thorpness, which is about 40 feet high, and has several houses about it. Southward of the ness, the bank gradually declines in height, and beach succeeds to Aldborough. The shore abreast Thorpness is rocky and foul from the cropping out of crag.

A Life-Boat is stationed at Thorpness, and rocket apparatus is kept there, and at Sizewell gap one mile to the northward.

DUNWICH BANK though formerly a separate shoal, may now for all practical purposes, be considered as the north-eastern extremity of Sizewell bank. Lying nearly parallel to the shore, it is about $1\frac{1}{3}$ mile long and one-quarter mile broad, and 22 feet upon the centre of it is E. by S., southerly, $1\frac{1}{3}$ mile from Dunwich church; the depth increasing gradually upon its south-west, north-west, and north-east sides. To clear the bank to the eastward, keep Covehithe church on with the north-east end of Easton cliff, bearing N.N.E. $\frac{1}{4}$ E., northerly, or keep the piers of Southwold harbour to the westward of North.

SIZEWELL BANK projects out from Thorpness E.N.E. for nearly 2 miles, and then slightly bending to the northward, it extends N.N.E. $\frac{3}{4}$ E. for 4 miles, and nearly joins Dunwich bank. The least water upon it (7 feet) is N.E. by E. $\frac{3}{4}$ E. $1\frac{3}{4}$ mile from Thorpness life-boat house, from whence it gradually deepens to 24 feet at its north-east termination; but towards Thorpness the bank is broken up into several irregular patches, between which the flood stream sets out strongly; 8 and 9 fathoms occur within one mile of the bank on the outside.

Buoy.—A *black* monster conical buoy lies in 7 fathoms, about $\frac{2}{3}$ mile outside the shoalest spot, with Leiston church, in line with a house on the north side of Sizewell gap, bearing W. by N.; and Thorpness coast-guard flagstaff, in line with the west end of a remarkable clump of trees, W.S.W. (southerly); Dunwich church, N. $\frac{1}{4}$ W., distant 4 miles; Aldborough church, S.W. by W., $4\frac{4}{10}$ miles; Orfordness high lighthouse, S.W., $8\frac{6}{10}$ miles; Aldborough Napes buoy, S. by W., $4\frac{8}{10}$ miles; and the Ridge buoy, S.W. $\frac{1}{2}$ S., $6\frac{4}{10}$ miles.

As in the case of Dunwich bank, Covehithe church, on with the north-east end of Easton cliff, bearing N.N.E. $\frac{1}{4}$ E., northerly, clears Sizewell

bank to the eastward; and it is cleared to the southward by keeping Orford castle, in line with Aldborough south mill, S.W. by W. ¼ W. Working in the neighbourhood of the bank at night, do not stand into a less depth than 10 fathoms, and tack when Orfordness lights bear S.W. ½ W.

A sector of *red* light shown from Orfordness low lighthouse between the bearings S.W. ¾ S. and S.W. covers Sizewell bank; the light being masked from the former bearing towards the shore, and on the latter bearing cutting 3 cables eastward of the buoy marking that bank.

ALDBOROUGH, or Aldeburgh, 2 miles to the south-west of Thorpness, consists of an irregularly built street one mile long, with side lanes, at the foot of a steep bank. A villa at the north-east end of the town, several windmills to the south and west, and the church on the summit of the bank, are the chief objects; the latter, dedicated to St. Peter and St. Paul, is a plain structure of freestone and flint, much disfigured by modern repairs with red brick.

A map of 1559 shows Aldborough to have been at that time a place of considerable magnitude, and it also represents the church as more than ten times its present distance from the sea, with broad denes in front of the town, as at Yarmouth. It was then a place of some importance, but during last century, many houses, with the market-place and cross, were overthrown by the sea, which here, as elsewhere on this coast, is gradually but surely gaining upon the land.

Aldborough is much resorted to by visitors in the summer season for sea-bathing.

A bend of the Alde passing close to the town affords facilities for trade, but as this river has a common outlet with the Ore, 9 miles farther to the south-west in Hollesley bay, the shipping and commerce of Aldborough will be found noticed under the head, Orford haven, page 207.

Anchorage.—There is good riding in Aldborough bay in off-shore winds, with Aldborough church bearing from N.W. by N. to N.W. by W., and Orfordness low lighthouse, S.W. by W., in 9 or 10 fathoms, sand.

Signal Station.—At Aldborough is a signal-station with which passing vessels may communicate by means of the International Code. *See* footnote, page 88.

A Life-Boat, rockets, &c., are stationed at Aldborough.

Vernal's or Vernon's wood, a flat topped copse or clump, stands on high ground a little inland of Aldborough, which, in approaching from the offing, is generally the first feature which shows above the horizon, serving as an excellent guide to distinguish this portion of the coast. Slaughden houses, and a massive Mortella tower and battery built in 1806 to contain

100 men, are half a mile to the south-west of Aldborough, at the bend of the Alde above alluded to, after which, a low shingle beach extends to Orfordness.

ALDBOROUGH NAPES is a narrow ridge in the offing abreast Aldborough, its centre having Aldborough church N.W. by W. $\frac{1}{2}$ W., $3\frac{3}{4}$ miles; the depth upon it varies between 22 feet and 5 fathoms; it lies north-east and south-west, and is 2 miles long and one-quarter of a mile broad; both sides are steep-to, the depths in approaching it decreasing rapidly from12 fathoms to 5 fathoms; the bottom fine sand. To the westward there is mud, to the north-eastward and eastward broken shells, and to the southward broken shells and stones.

Buoy.—The outer side of the shoal at its south-western end is marked by a *black* conical buoy, with staff and globe, in $4\frac{3}{4}$ fathoms; with Iken church, in line with the south windmill at Aldborough, bearing N.W. by W. $\frac{1}{4}$ W.; and the south side of Orford castle touching Orford church, W $\frac{1}{4}$ S.; Shipwash light-vessel, S.W. $\frac{1}{2}$ S., distant 7 miles; N.E. Bawdsey buoy, S.W. $\frac{1}{4}$ W., $7\frac{9}{10}$ miles; and Sizewell bank buoy, N. by E., $4\frac{8}{10}$ miles.

Orford castle, open on either side of Orford church twice the apparent breadth of the latter, bearing W. by S. southerly, and W. $\frac{3}{4}$ N., clears Aldborough Napes, passing to the northward and southward; Leiston church, in line with Thorpe life-boat house, N.W., leads to the north-eastward; and Iken church, (the summit of the tower is only just visible above the trees) over centre of Slaughden houses, N.W. $\frac{3}{4}$ W., or Vernal's wood over the Italian villa, N.W. by N., leads to the south-westward of it.

Between Sizewell bank and Aldborough Napes the depths are from 9 to 13 fathoms, over mud; Orfordness lights in line, bearing S.W. $\frac{1}{2}$ W., leads between the shoals at night; but, in standing towards the Napes, do not bring Orfordness high light to the westward of W.S.W., and when the low light bears West, the Napes will have been passed.

ALDBOROUGH RIDGE, a small in-shore shoal projecting from near Orfordness in a N.E. by E. direction, is about one mile long, and has 18 feet water over it. This shoal some years ago, was nearly connected with Orfordness by two smaller banks, Nathaniel knoll and the Onion, which still remain as a shallow with 4 and 5 fathoms upon them.

Buoy.—A *black* can buoy lies in 5 fathoms on the south-east side of Aldborough Ridge; with Vernal's wood, in line with the westernmost houses of Slaughden, bearing N. $\frac{1}{2}$ W.; Orford castle and church in line, West; Aldborough north mill, open to the left of south mill, N. $\frac{1}{4}$ E.; and Orfordness low lighthouse, S.W. by W. $\frac{1}{2}$ W., $1\frac{6}{10}$ mile.

Aldborough church, bearing N.N.W., or Iken church, in line with Slaughden Mortella tower, N.W. ½ W., clears Aldborough Ridge passing to the north-eastward; and Bawdsey cliff, kept open of Orfordness beach, W.S.W., clears it to the south-eastward. Orfordness lights in line, S.W. ½ W., leads within it, and this track is to be preferred at night.

Directions.—Bound to the north-eastward from abreast Orfordness and intending to pass outside Aldborough Napes, keep Orfordness low lighthouse to the northward of West until Aldborough church has been brought to bear N.W. ½ W., or Iken church appears open to the northward of the houses of Slaughden, bearing N.W. by W. ¼ W., when the coasting course may be shaped; but to pass inside the Napes, keep Bawdsey cliff open of the beach at Orfordness until Aldborough church has been brought on a N.N.W. ½ W. bearing, or Iken church shows open to the northward of Slaughden Mortella tower, when a N.E. ¾ N. course will lead inside the Napes, and more than one mile outside the buoy upon Sizewell bank.

TIDES.—It is high-water, full and change, at Orfordness, at 11h. 15m. Springs rise 8 feet, neaps 6½ feet, and neaps range 5 feet. Abreast Orfordness the flood stream sets W.S.W., and the ebb E.N.E., the former continuing until the time of high-water in Harwich harbour.

CHAPTER VII.

ORFORDNESS TO THE NAZE.

VARIATION, 17° 25′ West in 1882.

THERE are several extensive shoals lying about the sailing track from Orfordness to the Downs, or "Over the Kent," as this passage is termed among seamen; they are the Inner and Outer Gabbards, Galloper, Four-Mile Knolls and Falls to the eastward; and the Shipwash, Long sand, and Kentish Knock to the westward.*

INNER GABBARD, S.E. by S., 15¼ miles from Orfordness, extends N.E. by N. and S.W. by S., 6¼ miles, from the depth of 10 fathoms upon either end, and is nearly one mile broad; 12 feet (the least depth) prevails over about one and a half mile of the shoal from its centre, and the whole of it is steep-to on both sides.

Buoy.—A can buoy, *striped red* and *white vertically*, lies in 10 fathoms, on the north-west side of the Inner Gabbard, 3 miles from its north-eastern extremity; with the Outer Gabbard buoy, bearing E. ¾ N., distant 6 miles; Orfordness high lighthouse, N.W. by N., 15¼ miles; Shipwash light-vessel, N.W. ¼ N., 11½ miles; Long-sand buoy, W.S.W., 13¾ miles; Kentish Knock light-vessel, S.W., 17 miles; and Galloper light-vessel, S. by W. ⅛ W., 11 miles.

OUTER GABBARD, 4 miles to the eastward of the Inner Gabbard, is 4 miles long in a general N.N.E. ¾ E. and S.S.W. ¾ W. direction, from 10 fathoms water upon each end. On the north part of the shoal ground, a patch with 15 feet at low-water springs lies 2⅓ cables S.W. ¼ W. from the red buoy, which is moored in 8 fathoms to mark the north end of the shoal portion of Outer Gabbard shoal. A second shoal of 18 feet exists, which is 1½ cable in extent in a N.E. and S.W. direction. The south part of this second shoal lies in a direction S.W. ½ S. from the red buoy, distant 5½ cables; its north part is separated from the 15-feet patch by a channel of 1½ cable, in which there is 22 feet. On the south part of Outer Gabbard shoal, a ridge with from 25 to 30 feet, and six cables in extent N.N.E. and S.S.W., exists, the shoalest part, a patch of 22 feet, lies S.W. ¼ W., nearly

* *See* Admiralty chart, England, East coast, North Foreland to Orfordness, including the Entrance to the Thames, No. 1610; scale, mile=0·5 inch.

one mile from the buoy. Between the above northern and southern shoal parts of the Outer Gabbard, there is a channel about one cable wide with from 5 to 7 fathoms in it.*

This shoal, like the Inner Gabbard, is steep-to, but deeper water surrounds it. In still weather the tide ripple shows plainly over both shoals.

Buoy.—The Outer Gabbard is marked on its east side by a *red* conical automatic sound *buoy*, in 8 fathoms. From it, Orfordness high lighthouse bears N.W. ¼ W., distant 18¾ miles; Inner Gabbard buoy, W. ¾ S., 6 miles; and Galloper light-vessel, S.W. ¾ S., 14½ miles.

GALLOPER, to the southward of the Gabbards, lies north-easterly and south-westerly; its length is 5¼ miles from the depth of 10 fathoms upon each end, and it is rather less than half a mile broad; there is only 2 fathoms over the main body of the shoal, and near the northern end of the shoal portion scarcely one fathom; it is steep-to, and the bottom in its vicinity consists of muddy sand, stones, and gravel.

GALLOPER LIGHT-VESSEL.—Since 1803, the Galloper has been marked by a light-vessel, which is moored in 20 fathoms, about one mile N. by W. of its south-west extremity. She exhibits two *fixed white* lights horizontally on separate masts, each light being 35 feet above the water, and visible 10 miles off in clear weather.

Fog Signal.—A gong is sounded during thick or foggy weather.†

From the light-vessel, the shoalest part of the Galloper bears N.E. ¼ E., distant 3 miles; Shipwash light-vessel, N. by W. ⅓ W., 20 miles; S.W. Shipwash buoy, N.W. ½ N., 15⅔ miles; Long-sand-head buoy, N.W. by W. ½ W., 11¾ miles; Kentish Knock light-vessel, W. ½ S., 10 miles; and North Foreland lighthouse, S.W. by W., 28¾ miles.

BUOYS.—North Galloper, a large conical buoy, *striped black* and *white horizontally*, with staff and diamond, lies off the north end of the Galloper in 14 fathoms; with Galloper light-vessel bearing S.W., distant 4⅛ miles; Kentish Knock light-vessel, W. by S. ½ S., 14 miles; Inner Gabbard buoy, N. ½ W., 7½ miles; Outer Gabbard buoy, N.E. by N., 9½ miles. These bearings and distances place the buoy in lat. 51° 49′, long. 1° 59′ E.

A *black* can watch buoy lies in 8 fathoms near the south-west extremity of the shoal, S.E. by E., ¾ mile from the light-vessel.

LONG SAND, within or to the westward of the Galloper, is the north-easternmost of an extensive chain of sands, which, from abreast the

* From an examination made by Staff Captain John Parsons, R.N., H.M.S. *Porcupine*, 1874.

† *See* regulations respecting light-vessels, footnote, page 101.

Naze to the Kentish shore, forms the eastern boundary of the eastern channels into the Thames. This sand is 19 miles in length, and its width increases from one mile at its north-east end to 5 miles at the south-west end, the depths are from one to 6 feet over a considerable portion of the shoal, and it dries in several places.

Buoy.—The north-east extremity of the Long sand is marked by a *black* bell buoy, bearing a staff and St. Andrew's cross; it lies in 7 fathoms, $1\frac{1}{4}$ mile from where the sand dries, with Walton hall, open to the northward of the Naze tower, bearing N.W. $\frac{1}{3}$ W.; Sunk-head buoy, W. $\frac{1}{2}$ N., distant 5 miles; Sunk light-vessel, N.W. $\frac{3}{4}$ N., $4\frac{3}{4}$ miles; S.W. Shipwash buoy, N. $\frac{1}{3}$ E., $6\frac{2}{3}$ miles; Galloper light-vessel, S.E. by E. $\frac{1}{2}$ E., $11\frac{3}{4}$ miles; and Kentish Knock light-vessel, S. $\frac{1}{2}$ E., $6\frac{1}{2}$ miles.

KENTISH KNOCK is to the south-eastward of Long sand, and separated from it by a channel called Knock Deep, $2\frac{1}{2}$ miles wide and from 9 to 13 fathoms deep. From a depth of 10 feet upon the north-east extremity of the Kentish Knock, Long-sand buoy bears N. by E., distant 5 miles; and North Foreland lighthouse, S.W. $\frac{3}{4}$ S., $20\frac{3}{4}$ miles; from this point the shoal to a depth of 5 fathoms at its other end has a south-west direction for 7 miles, and is 2 miles broad; on fully 4 miles of the body of it the depth is less than one fathom, and, at low-water, portions of it are left dry. The shoal shelves gradually to the south-westward, but is steep-to in other directions.*

KENTISH KNOCK LIGHT-VESSEL was placed in 1840; she lies in 11 fathoms, $1\frac{3}{4}$ mile to the eastward of the sand, in lat. 51° 40′ 59″ N., long. 1° 40′ 57″ E.; and shows a *white* light which *revolves every minute*, at the height of 35 feet above the water, and may be seen at the distance of 10 miles in clear weather.

Fog Signal.—During thick or foggy weather, a horn gives *two blasts* in quick succession every *two minutes*.

The vessel carries at her mast-head two balls of unequal size, the smaller one being a short distance above the other.† From her, Long-sand buoy bears N. $\frac{1}{2}$ W., distant $6\frac{1}{2}$ miles; Shipwash light-vessel, N. by E. $\frac{1}{8}$ E., $20\frac{3}{4}$ miles; Inner Gabbard buoy, N.E., 17 miles; Galloper light-vessel, E. $\frac{1}{2}$ N., 10 miles; and North Foreland lighthouse, S.W. $\frac{1}{8}$ S., $20\frac{1}{2}$ miles.

BUOYS.—The Kentish Knock is also marked on its outer side by the following buoys:—

North Knock, *red* conical, with staff and globe, lies in 7 fathoms, at the north-east extremity of the sand; from it, the light-vessel bears S.E. $\frac{3}{4}$ S., distant $2\frac{1}{4}$ miles; and Long-sand-head buoy, N. by E., $4\frac{3}{8}$ miles.

* *See* Admiralty chart of river Thames, sheet 1, Kentish Knock and the Naze to West Swin, No. 1,975; scale, mile = 1·4 inch.

† *See* regulations respecting light-vessels, footnote, page 101.

Middle Knock, *red conical*, in 10½ fathoms, ¼ mile from the south-east part of the sand; with North Knock buoy bearing N. by E. ¼ E., distant 4¼ miles; Kentish Knock light-vessel, N.E. ¼ E., 2½ miles; and South Knock buoy, S.W. by W. ½ W., 3¾ miles.

South Knock, a *red conical* buoy of the largest size, with staff and globe, outside the south-west extremity of the sand; it has K.K. marked upon it, and lies in 12 fathoms; with Broadstairs mill, open westward of the trees to the right of North Foreland lighthouse, bearing S.W. ¼ S.; and Minster east mill, open to the right of Margate church tower, S.W. ½ W.; Kentish Knock light-vessel, N.E. ¾ E., distant 7½ miles; Middle Knock buoy, N.E. by E. ¼ E., 3¾ miles; Tongue light-vessel, W. by S. ¼ S., 16¾ miles; and North Foreland lighthouse, S.W. ¼ S., 13½ miles.

Two watch buoys also lie near the sand, the one a *black can*, in 11½ fathoms, W.N.W., ⅞ mile from the light-vessel; and the other a *red can*, in 7 fathoms, at the south-west extremity of the sand, N.N.W. ½ W., 1⅞ mile from South Knock buoy.

FOUR-MILE KNOLLS and FALLS.—Four-Mile Knolls are upon the head or north-east end of the Falls. The North and South Falls may be described as a ridge 30 miles long, and at no part more than one-quarter of a mile broad, beginning 2 miles to the southward of the Galloper, and ending abreast of, and 7 miles outside, Goodwin sand. Four-Mile Knolls, which have 4 fathoms upon them, and are the highest portion of the ridge, bear S. by W. about 4 miles from Galloper light-vessel. The North Fall extends N.E. by N., one mile, and S.W. by S., 4½ miles from Four-Mile Knolls, with a general depth over it of 7 to 10 fathoms; there is then a depression in the ridge, with 12 to 13 fathoms over it, in a S.W. ½ S. direction for 9½ miles, after which, as the South Fall, it holds S.S.W. ½ W., for 15 miles, and ends outside the Goodwin as before stated. The general depth upon the South Fall is 7 and 8 fathoms, but for a considerable extent near the centre there is only 4½ or 5 fathoms; from the shoalest spots, North-sand-head light-vessel bears W. by N. and N.W. ½ W., distant 7 miles.

Depths of 16 to 18 fathoms prevail between the Galloper and the north-east extremity of the Falls, which are for the most part steep-to, there being 22 to 24 fathoms within a short distance of either side.

Directions from Orfordness to the Downs.*—Bound to the Downs and being abreast Orfordness, pass 2 miles outside Shipwash light-vessel; Orfordness high lighthouse kept N.N.W. ½ W., clears the Shipwash. From this position, Kentish Knock light-vessel bears S. by W. ⅞ W., distant 20 miles, and Galloper light-vessel, S. by E., 18½ miles; but, in shaping a course, allowance should be made for the tide

* *See* Admiralty chart of North Sea, sheet 1, No. 1,406; scale, mile = 0·3 inch.

streams, which run S.W. and N.E., except near the shoals, when they set obliquely across them. The flood stream also during springs runs across Long-sand-head into Black Deep, veering at the last-quarter more north-westerly, or nearly athwart the sand.

Working, stand towards the Shipwash into 12 fathoms, and towards Long sand into 10 fathoms; the Naze tower and tree in line, bearing N.W. $\frac{3}{4}$ W., (the mark for Goldmer gatway, page 222), or Walton hall open north of the Naze tower, will clear Long-sand-head; then stand off to 16 or 17 fathoms. A gully, one mile wide, and having 22 to 24 fathoms in it, extends from 2 miles within the Inner Gabbard to 4 miles within the Galloper; therefore, by a proper attention to the lead, these dangerous shoals may be easily avoided.

Steering to the eastward or westward in the vicinity of the Galloper, pass either one mile to the southward of the light-vessel, or more than 4 miles northward of it.

Closing the Kentish Knock from northward or southward, do not bring its light-vessel to the southward of S. $\frac{3}{4}$ W., or to the eastward of N.E. $\frac{1}{4}$ N., in order to maintain a safe distance from the shoal. The channel between the Kentish Knock and Long sand is not buoyed, and should only be used under exceptional circumstances. From a position one mile to the eastward of Kentish Knock light-vessel, S.W. by S., or S.S.W., for 22 miles, will lead to the mouth of Gull stream, or outside North-sand-head light-vessel.

TIDES.—At Galloper light-vessel is afforded another instance of the rotatory movement of the tide streams. At 5h. 40m., or low-water by the ground, the ebb stream becomes weak, and veering to E. by N. and East, in half an hour ceases. The flood stream begins to run in a S.E. direction, veering to the southward and westward till 6h. 45m., when it sets about S.W., and so continues until 9h. 45m. (4 hours after low-water). During the next two hours it veers to W.S.W., and from 11h. 45m. to 0h. 10m. to W. by S. and West, with slack water. The first of the ebb stream sets to the N.W., veering round by the north and east, until at 0h. 40m. its direction is N.E.; it continues so till 3h. 40m. During the next two hours it changes to E.N.E., then to E. by N., and finally to East.

At Kentish Knock light-vessel, the flood stream comes from the north-eastward, and it is high-water, full and change, by the ground, about 11h. 47m., and low-water at 6 o'clock. At 5h. 45m., the stream begins to run south-westerly towards the eastern part of Margate sand, and between that time and 10h. 30m. it veers a little westward; then it runs W.S.W., W. by S., and West, and ceases. The set of the ebb stream begins at N.W., and gradually draws round to North and N.E., when the reverse of the flood stream takes place.

ORFORDNESS and LIGHTS.—Orfordness,* a low point of shingle, and the north-eastern limit of the well-known anchorage, Hollesley bay, has two lighthouses upon it, N.E. ½ E. and S.W. ½ W., 1,439 yards from each other. The low lighthouse, standing a little to the north-eastward of the ness, was built in 1792. It is a handsome sixteen-sided tower, 72 feet high, and exhibits a *fixed white* light. The high lighthouse, a circular tower, situated a short distance to the westward of the ness, and erected more than a century ago, is 99 feet high, and also shows a *fixed white* light. The lights are, respectively, 60 and 91 feet above high-water, and they are visible in clear weather at the distances of 14 and 17 miles. A sector of *red* light from the high lighthouse is visible between the bearings E. by N. and E.N.E.; from the former bearing the light is masked towards the shore, and on the latter bearing is on a line with the southern limit of 4 fathoms at low-water of spring tides in Hollesley bay, until abreast of Orford haven. A sector of *red* light is also exhibited from the low lighthouse between the bearings S.W. ¾ S. and S.W. covering Sizewell bank; the light being masked from the former bearing towards the shore, and on the latter bearing cutting 3 cables eastward of Sizewell bank buoy. Both lighthouses are painted *red* and *white* in horizontal bands. In line, S.W. ½ W., they lead between Sizewell bank and Aldborough Napes (page 193); and the low lighthouse, open north of the high lighthouse, bearing N.E. ¾ E., clears the Whiting in 4 fathoms, and directs up to the Cutler.

Rockets and lines are kept at Orfordness, and also at Orford haven.

Orford Church and Castle, standing 2 miles within the lighthouses, are among the most striking objects on first sighting the land hereabouts. The former, dedicated to St. Bartholomew, is a very ancient structure, consisting of a nave, side aisles, and tower. Its chancel is in ruin, and the upper part of the tower fell in 1829, and has not since been restored. The castle, of Norman origin, stands upon a small mound to the westward of the village; its keep is a polygon of eighteen sides described within a circle of 27 feet radius, and flanked by three square towers placed on the west, north-east, and south-east sides; the towers are 22 feet wide, and overlook the polygon which is 90 feet high. The walls, 22 feet thick at the base, are immensely strong and in excellent preservation. In



Orford castle, W. by N. ¾ N., 1 mile.

* *See* Admiralty chart of Approaches to Harwich, No. 2,052; scale, mile = 1·5 inch; with plan of Woodbridge haven.

consequence of it being an old established sea-mark, Government prevented its demolition by the late Marquis of Hertford in 1805.

The COAST.—The shore of Hollesley bay, from Orfordness to Bawdsey cliff, is a low shingle beach, and the only marked objects upon it are two black boat-houses, a cluster of whitewashed cottages at Orford haven named Shingle-street, and five Mortella towers between the haven and Bawdsey cliff. Hollesley church is the only prominent object in the well-wooded background.

Bawdsey Cliff is of a reddish colour, and bears upon its face numerous marks of land-slips. A large white house among wood, inland and to the northward of the cliff, a windmill at Alderton, and Bawdsey church, with its broad stunted tower, are all plain objects. Bawdsey sea-mark, an obelisk painted *red* and *white* in horizontal bands, stands near the north-east end of the cliff; in line with Bawdsey church, it clears the Roughs on the north-east edge in 27 feet.



Bawdsey church, W. ¼ N., 1 mile.



Bawdsey sea-mark.

WHITING BANK.—Opposite the section of coast just noticed, and lying in a direction conforming to it, are several shoals, at 2, 4, and 6 miles in the offing. The innermost of these is the Whiting, which forms the south-east boundary, and the principal defence to Hollesley bay; from 3 fathoms upon the north-east end of the shoal, Orfordness high lighthouse bears N.E. ⅔ N., distant $1\frac{4}{10}$ mile; from this, curving westerly, it extends S.W. by W. for $2\frac{3}{4}$ miles to the same depth at the other end, with a breadth of one-quarter mile about its centre, or widest part; the depths over a large portion of it vary from 9 to 10 feet, while there are 6 to 7 fathoms close-to on either side. Dovercourt high light becomes obscured on a W. by S. bearing at the south spit of the Whiting.

BUOYS.—The extremities of the Whiting, and its inner or north-western side, are marked by the following buoys:—

N.E. Whiting, a *red* and *white horizontally striped* conical buoy, with staff and diamond, lies in $3\frac{1}{2}$ fathoms, at the north-east extremity of the shoal; with Orfordness high lighthouse bearing N.E. ½ N., distant $1\frac{1}{3}$ mile; Orford west windmill, open to the westward of Orford church, N. ¾ W.; and Mortella tower T.,* near Woodbridge haven, just open of Bawdsey cliff, W. by S. ¾ S.

* The letters to the Mortella towers are for reference in the chart of the Approaches to Harwich.

Hook of Whiting, *red* and *white vertically striped* can, in 3 fathoms, W. by S. ½ S., one mile from N.E. Whiting buoy; with Orfordness low lighthouse, its breadth open to the right of the high lighthouse, bearing N.E. ¾ E.; and Orford west windmill, three times its width open of the west side of Orford castle, N. by E.

S.W. Whiting, *red* and *white chequered* can, in 4½ fathoms, at the south-west extremity of the shoal, S.W. ½ W., $1\frac{7}{10}$ mile from Hook of Whiting buoy; with Boyton windmill and hall in line, bearing N. by W.; and Orfordness low lighthouse, touching the east side of the high lighthouse, N.E. ½ E.

Flagstone and Kettlebottom.—The Flagstone is a patch of foul ground with 4¾ fathoms over it, a little within the south-west tail of the Whiting; the Kettlebottom is a small irregular sandy patch of 2¾ and 3½ fathoms, 2 miles S. by W. ¾ W. from the south-west extremity of the Whiting, and one mile from the north-west side of Bawdsey sand. It lies out of the usual sailing track.

BAWDSEY BANK, forming the north-western boundary of the channel named the Shipway, is to the south-eastward of the Whiting. Its north-east extremity (4 fathoms) is S. ½ W., 2⅔ miles from the north-east end of the Whiting; with Orfordness high lighthouse, bearing N. by E. ¼ E., distant 3¾ miles; from thence it extends S.W. by W. for 4¼ miles, with an irregular breadth of half a mile. The least water upon it, 15 feet, is about 1½ mile from the north-east end, with 17 feet towards the south-west end, while a depth of 7 fathoms is close to it on either side.

BUOYS.—Bawsdey bank is marked by two buoys.

N.E. Bawdsey, *black* conical, in 4½ fathoms, upon the Bawd head or north-east end of the sand; with the south side of the tower of Bawdsey church, touching the north side of Mortella tower (X) to the north-eastward of Bawdsey cliff, bearing W. by N.; Orfordness high lighthouse, N. by E., distant $3\frac{7}{10}$ miles; and Shipwash light-vessel, E. by S., $1\frac{7}{10}$ mile.

S.W. Bawdsey, conical, with *black* and *white horizontal stripes*, lies in 6½ fathoms; with Hollesley church, in line with the eastern Mortella tower (ΛΛ) below Bawdsey, bearing N. by W. ½ W.; and a remarkable round tree, the next westward of Falkenham church, in line with the west end of Bawdsey cliff, N.W. ½ W.; N.E. Bawdsey buoy, N.E. ¾ E. easterly, distant $4\frac{9}{10}$ miles; and Shipwash light-vessel, E.N.E., 5½ miles.

SHIPWASH SAND, the south-eastern boundary of Shipway channel, is the outermost of the dangers just referred to; from 5 fathoms upon its north-east end, Orfordness high lighthouse bears N. by W., 4½ miles; its direction is then S.S.W. ½ W. for 3½ miles, and S.W. ¼ S. for

4½ miles to the corresponding depth on the south-west extremity: In no part is the sand more than three-quarters of a mile broad, its summit is broken into patches, two of which near the centre of the shoal have as little as one foot upon them ; it is also steep-to on both sides.

SHIPWASH LIGHT-VESSEL, moored in 9 fathoms, N. ¾ W., one-third mile from the north-east end of the sand, was placed in 1837 to render the Shipway navigable at night, by which the round through Hollesley bay is avoided. She bears one *fixed white* light, 34 feet above the water, and visible at the distance of 10 miles in clear weather.

Fog Signal.—In thick or foggy weather, a horn sounds blasts, of *five seconds* duration, with an interval of *two minutes* between each blast.*

From this vessel, Aldborough north windmill is its apparent breadth open to the eastward of Aldborough south windmill, bearing N. by E. ; and Bawdsey church is a little open to the northward of the second Mortella tower (X) to the north-east of Bawdsey cliff, W. by N. ; Orfordness high lighthouse, N. by W. ¼ W., distant 4$\frac{1}{10}$ miles ; Aldborough Napes buoy, N.E. ¾ N., 7 miles ; Bawdsey N.E. buoy, W. by N., 1$\frac{7}{10}$ mile ; Sunk light-vessel, S.W. ⅔ S., 12$\frac{7}{10}$ miles ; Inner Gabbard buoy, S.E. ¼ S., 11½ miles ; and Galloper light-vessel, S. by E. ⅓ E., 20 miles.

BUOYS.—The following buoys also mark the Shipwash :—

Middle Shipwash, a can *chequered black* and *white,* lies in 9 fathoms, close to the inner side of the sand ; with Bawdsey church, in line with Mortella tower (W), bearing N.W. ⅓ W. ; and Orfordness low lighthouse, under the east end of Vernal's wood, N. by E. ¼ E. ; Shipwash light-vessel, N.E. by N., distant 4 miles ; Bawdsey S.W. buoy, N.W. by W. ⅞ W., 3$\frac{2}{10}$ miles ; and South Middle Shipwash buoy, S.W. ¼ S. southerly, 2$\frac{4}{10}$ miles.

South Middle Shipwash, a cylindrical-shaped buoy painted in black and white vertical stripes, lies in 6½ fathoms, to cover the knuckle in the sand ; with Middle Shipwash buoy bearing N.E. ¼ N. northerly, distant 2$\frac{4}{10}$ miles ; S.W. Shipwash buoy, S.S.W. ¼ W., 2$\frac{1}{10}$ miles ; and Rough buoy, W. ¼ N., 3$\frac{8}{10}$ miles.

S.W. Shipwash is a conical buoy of the largest size, *striped horizontally black* and *white,* with staff and triangle. It lies in 6 fathoms on the south-west end of the sand, with Harwich spire, open a distance equal to its apparent height to the northward of Landguard fort, bearing N.W. ¾ W., and Orfordness high lighthouse, under the east end of Vernal's wood, N. by E. ¾ E. ; S.W. Bawdsey buoy, N. ½ W., distant 5 miles ; Cork light-vessel, N.W. ⅔ W., 7$\frac{4}{10}$ miles ; N.E. Gunfleet buoy, W. by S. ⅔ S., 7⅗ miles ; Sunk light-vessel, S.W. ¼ W., 4$\frac{4}{10}$ miles ; Long-sand-head buoy, S. ⅓ W.,

* *See* regulations respecting light-vessels, footnote, page 101.

6¼ miles; Kentish Knock light-vessel, South, 13¼ miles; Galloper light-vessel, S.E. ½ S., 15¾ miles; and South Middle Shipwash buoy, N.N.E. ¼ E., $2\frac{1}{10}$ miles.

East Shipwash, *black* conical, lies on the eastern side of the sand in 12½ fathoms; with Alderton mill, open east of the third Mortella tower north-east of Bawdsey sea-mark, bearing N.W. ⅓ W.; Shipwash light-vessel, N. by E., distant $3\frac{7}{10}$ miles; Middle Shipwash buoy, W. ¾ N., 1½ mile; and S.W. Shipwash buoy, S.W. ¼ W., $5\frac{2}{10}$ miles.

CUTLER is a rocky shoal abreast of, and 1½ mile from, Bawdsey cliff; there is a passage between it and the shore. The general direction of the shoal is S.W. and N.E.; it is 1½ mile long, and one-third of a mile wide, and the least depth, 4 feet, is half a mile from its south-west end. Dovercourt high light becoming obscured on a W. by S. bearing marks the northern edge of this shoal.

Buoy.— A *red* can buoy lies in 4½ fathoms, half a mile to the southward of the south-west tail of the Cutler; with Orfordness low lighthouse, open twice its breadth to the eastward of the high lighthouse, bearing N.E ⅔ E.; and the Mortella tower (P) on Landguard east beach, appearing between Harwich lighthouses, W. ⅔ N.

LOWER ROUGH, one of the shoals to the south-west of the passage named the Sledway, is an irregular rocky shoal 1½ mile long, North and South, and ¾ of a mile broad; the shoalest spot upon it has 15 feet, but the prevailing depths over it are from 3 to 4 fathoms; there are 6 and 7 fathoms about it to the north-eastward.

Buoy.—A conical buoy, striped *horizontally red* and *white*, lies in 3½ fathoms, near the south end of the shoal portion of the Lower Rough; with Alderton rectory, appearing midway between Alderton windmill and Bawdsey sea-mark, bearing North; and Harwich spire, in line with the middle of Landguard fort, N.W. ¾ W.

UPPER ROUGH, the last of the offing shoals to be noticed here, is another rocky patch, with 16 feet upon it, lying close to the south-westward of the Lower Rough. It is out of the proper track of shipping, and is therefore unbuoyed.

The description of the shoals in the progress towards the Thames is continued on page 220.

The SHIPWAY, the channel between Bawdsey bank and the Shipwash, is about 2 miles wide, with depths of from 6 to 10 fathoms in it. Both sides of the passage are steep-to.

Directions.—From one mile outside Aldborough Napes, a S.W. ½ W. course for 7 miles will lead nearly one mile to the westward of Shipwash light-vessel and to the entrance of the Shipway, whence a S.W. ½ S. course for 13 miles, will carry through that channel, 1¼ mile outside West rocks, to

1¾ mile outside the Gunfleet, and one mile within Sunk light-vessel at the entrance of East Swin. The depths in this track are irregular, varying from 6 to 11 fathoms, the shoalest water being between the south-west end of the Shipwash and the Lower Rough, where, at 2 cables to the eastward of the track, is a patch of 27 feet named the Threshold.

Attention must be paid to the set of the tide streams, which run fairly through the main channel, but across the shoals W.S.W. and E.N.E. from anywhere in their vicinity.

At night, being nearly one mile to the westward of Shipwash light, a S.W. ½ S. course for 13 miles will lead one mile to the westward of Sunk light. In working, tack directly the water begins to shoal on either side. The south-west end of the Shipwash will have been passed when Cork light bears N.W. ½ W. Whether running or working, be careful (and particularly with an ebb tide) not to bring Shipwash light to the northward of N.E. ½ N., in order to avoid the Shipwash.

Directions for East Swin are on page 235.

HOLLESLEY BAY, the anchorage within the Whiting, extending from Orfordness to abreast Orford haven, is 4 miles long and from one to 1½ mile wide. It is devoid of shelter with the wind between N.E. by E. and East, but is protected from every other quarter, and large fleets occasionally use it, as the whole space between the Whiting and the shore is available for berthage. Hollesley church, bearing N.W. ½ W., is the mark for the south-western limit of the anchorage; outside, or to the south-westward of this line no protection is afforded by the Whiting, and the bottom becomes irregular and foul. Near the Whiting the bottom is sand, in the middle of the bay it is mud and sand, and towards the shore mud and clay; the depths are from 4 to 7 fathoms over the greater portion of the bay, the deepest water being near the Whiting. A sector of *red* light from Orfordness high lighthouse, bearing E.N.E., is on a line with the southern limit of 4 fathoms in Hollesley bay.

Directions.—Entering Hollesley bay from the eastward and south-eastward, Orfordness is to be approached from the offing with the high lighthouse bearing between W. ½ S. and N.N.W. ½ W. The ness is steep-to, there being 10 fathoms water within 3 cables of it, but it is necessary to guard against an eddy which is formed on either side of the point during flood and ebb. In rounding the ness, keep within half a mile of it to avoid the Whiting, until the low lighthouse has been brought open to the northward of the high lighthouse, bearing N.E. ¾ E., which is the leading mark into and through Hollesley bay by day and night.

Orford west mill, in line with Orford church, bearing N. by W. ¼ W., clears the north-east end of the Whiting in 4 fathoms.

In working, after having entered the bay, stand towards the shore by the lead, and towards the Whiting until the lighthouses have been brought nearly in line. Boyton windmill, open to the westward of Boyton hall (a white house surrounded by wood), bearing N. by W., crosses the south-west end of the Whiting in 4 fathoms. Dovercourt high light becomes obscured on a W. by S. bearing at the south spit of the bank in 5 fathoms.

The tides at Orfordness have been given on page 194.

SLEDWAY, the passage from Hollesley bay to the south-west part of the Shipway, has Whiting, Kettlebottom, and Bawdsey banks to the north-eastward, and the Cutler and Lower Rough to the south-westward.

Directions.—In proceeding through the Sledway from Hollesley bay, Orfordness low lighthouse must be kept a little open to the northward of the high lighthouse, bearing N.E. $\frac{3}{4}$ E., until Hollesley church bears N.W. $\frac{3}{4}$ N.; then steer S.S.W. $\frac{3}{4}$ W. until Bawdsey church has been brought in line with the sea-mark, N. by W., northerly, or until Hollesley church appears midway between the two eastern Mortella towers Z and AA, bearing N. $\frac{1}{2}$ W., which are leading marks through the Sledway, passing a short distance from patches of $4\frac{3}{4}$ fathoms to eastward of the Lower Rough.

Working out or in, stand towards Bawdsey bank into 6 fathoms, towards the Cutler and Rough into $5\frac{1}{2}$ fathoms, and towards the Shipwash into 7 fathoms.

The directions, in continuation towards the Thames, are on pages 225 and 235.

In the neighbourhood of the Cutler, keep Orfordness low lighthouse open to the south-eastward of the high lighthouse, for in line they lead along the outer edge of the shoal in 22 feet, and a patch of 18 feet lies outside 2 cables. Ramsholt church, open of the west end of Bawdsey cliff, bearing N. by W., clears the Cutler, passing to the south-westward; and the Mortella tower (R), upon the west end of Felixstowe cliff, bearing W. by N. $\frac{3}{4}$ N., leads to the southward of both the Cutler and Bawdsey bank.

Mortella tower (P), a little open of Felixstowe cliff, W. by S. $\frac{1}{2}$ S., leads within the Cutler.

Dovercourt high light becomes obscured on a W. by S. bearing at the north-east end of the Cutler.

ROUGH CHANNEL, the passage from the Shipway to Harwich Pitching ground, has for its south-west boundary the Lower Rough, Cork sand, and Cork ledge. The leading mark is, Harwich old low light-tower open north of Landguard fort, bearing N.W. by W. $\frac{1}{2}$ W., or Landguard

point open of Cork light-vessel. The night leading mark is Cork light bearing W. by N. ¾ N.

ORFORD HAVEN, opening into the south-west part of Hollesley bay, through a foreshore composed of shingle, is not readily to be discerned from the sea, but the position of the entrance may be known from it being near the northernmost Mortella tower, which has a cluster of low cottages, named Shingle-street, standing close to the north-eastward of it.

Orford haven is formed by the outlet of the rivers Alde and Ore. These rivers meet near Snape bridge, and the stream then has a winding course through broad muddy flats to Slaughden quay, near Aldborough, where the original outlet would seem to have been. Having approached to within 73 yards of the sea, the river bends abruptly to the south-westward; 6 miles lower it encircles Havergate island, and receives the waters of the Butley, and finally reaches its outlet at 9 miles below Aldborough, and 2 miles from the north-east end of Bawdsey cliff. It may be mentioned as a peculiarity of this river that, except in one place a little below Slaughden quay, it is free from shoals.

The frequent presence of the North Sea fleet in Hollesley bay, during the last continental war, gave an increased importance to the Ore, and several plans were laid before the Government of the period for cutting through the beach, and converting the river into a wet dock, but they were all deemed impracticable.

Orford has a small quay at which coasters discharge. The church and castle have been noticed on page 200. The town is small and meanly built, but it was formerly of more importance, having sent three ships and sixty-two men to the siege of Calais in 1359; it possessed also a considerable trade, which gradually left it owing to the defective state of the harbour.

The custom-house is at Woodbridge, of which Aldborough is also a creek. The trade of Orford consists of exports of corn and wool, and imports of coal and timber. Aldborough imports foreign corn, besides coal and timber; the exports are chiefly corn and wool; the whole trade giving employment to many vessels of from 50 to 150 tons each.

Population in 1871:—Orford, 1,022; Aldborough, 1,990.

There are quays at Iken and at Snape bridge, from whence considerable quantities of barley are shipped for London.

Entrance and Bar.—The entrance to Orford haven is subject to frequent change, and there were lately persons living whose memories went back to the time when it was 1½ mile westward of its present position, but wherever situated, its principal features remain the same. The extremity

of the eastern beach is named the North weir, or North ear, below which are several detached banks of shingle termed the Haven knolls, and through these the river maintains a channel, and generally a swatchway besides; 5 feet is the average depth over the bar at low-water springs.

Directions.—There are several beacons for guiding through the channel and swatchway into Orford haven, and they are shifted immediately any change occurs in the entrance, but its liability to change precludes any directions being given for it. Four harbour pilots reside at Shingle-street, and they are to be procured by hoisting the usual pilot flag by day, and a light by night, but should a vessel be forced to run for the haven at a time when the pilots cannot venture off, they then station themselves upon the leading beacons and direct the course to be steered by the waving of flags. The most difficult time for entering is with the wind from N.N.E., on account of the nature of the channel, and the weight of sea then upon the bar.

TIDES.—It is high-water, full and change, at Orford bar, at 11h. 30m., Orford quay at 0h. 30m., Slaughden at 1h., and at Snape bridge at 3h. Ordinary springs rise 7½ feet at the bar, 7½ feet at Orford quay, 7½ feet at Slaughden quay, and 6 feet at Snape bridge, the limit of the navigation.

WOODBRIDGE HAVEN, or Bawdsey haven, at the south-west end of Bawdsey cliff, is formed by the outlet of the Deben, a river which has a course of 30 miles by Debenham, Wickham Market, and Woodbridge, and joins the sea, as in the case of the Ore, through detached and shifting banks of shingle.*

Woodbridge, the principal town, is upon a bold and diversified slope on the right bank of the river, 8½ miles within the bar; its church, a noble structure of flint and freestone, has a tower 180 feet high, but as the town is not visible from the sea, a further description of it is needless. There are a custom-house, bonded warehouses, and several quays and slip docks, in which vessels lie and discharge securely. The trade is in corn, malt, coal, timber, wine and spirits, conveyed in vessels, varying in burden from 30 to 200 tons, and drawing from 6 to 13 feet. The arrivals in 1880 were 806 vessels, with a total tonnage of 43,848 tons. Population, 4,403 in 1871.

The navigation for sea-going vessels ends at Woodbridge, but vessels of light draught reach Melton, 1½ mile higher up. The river is in its natural state and unimproved; the sides of the channel are marked by poles and bushes instead of buoys, and as the deep water ends one mile below Wood-

* *See* plan of Woodbridge haven on Admiralty chart, Harwich Approaches, No. 2,052.

bridge, vessels are often forced to discharge a portion of their cargoes to admit of their reaching the quays at that place.

Bar and Entrance.—The bar of the Deben is constantly varying in height and position, and the channel also is similarly affected, but the pilots move the leading beacons, or "meets," as they are termed, according to circumstances. At night, lights are shown from these beacons when needed.

Buoy.—A small *red* conical buoy, marked W.E. Haven, lies in 3 fathoms, outside the Haven knolls, with Ramsholt church, just open of the south-west end of Bawdsey cliff, bearing N. by W.; and the Mortella towers W. and X. in line, open eastward of Bawdsey sea-mark, N.E. $\frac{1}{8}$ E.

The least depth in the western channel over the bar of the Deben at low-water springs, when surveyed in 1873, was 2 feet. As at the Ore, entry is difficult with the wind and sea on, but happily the close neighbourhood of Harwich harbour renders such an attempt unnecessary. There are ten pilots for the service of the bar and river. Vessels drawing 11 feet can reach the docks or slips at Woodbridge during springs, and those of 9 feet draught at neaps; and it may be noted that any vessel able to cross the bar, may also reach Kingston quay, one mile below Woodbridge.

Rocket apparatus for saving life is kept at the haven.

TIDES.—Springs rise 12 feet at the bar of the Deben, 10 feet at Kingston quay, and 7 feet at Wilford bridge; and high-water occurs at those points, respectively, at 11h. 45m., 0h. 35m., and 0h. 55m.

The COAST.—Cliff begins half a mile to the south-westward of the Deben, and, alternating with grassy bank, continues for 2 miles to Landguard east beach, when the high ground trends more westerly.

FELIXSTOWE stands nearly midway, upon the summit and face of the bank; the church with a stunted spire is not prominent, but several large and handsome villas are near the water's edge. The sea has made great ravages on this shore, and the evil was increased by the partial removal of a massive ledge of cement stone from the frontage which had served the purpose of a breakwater, besides which, its removal permitted the unobstructed passage of shingle to the south-westward, to the great detriment of Harwich harbour.

LANDGUARD FORT.—From Felixstowe cliff, a low shingle beach extends for 2 miles to the south-westward to Landguard fort, where it forms the point on the eastern side of the entrance to Harwich harbour. The fort was built in the reign of James I. for the defence of the harbour, and was subsequently enlarged and supplied with water led in pipes from

the neighbouring village of Walton. It has recently been converted into an armour-plated fort.

LIGHTS.—A lighthouse stands 267 yards from the extremity of Landguard point, and exhibits a *fixed* light 33 feet above high-water; on approaching the harbour it is not seen until the Andrews buoy has been passed, or when it bears N. by W. $\frac{7}{8}$ W.; it then shows *red* to as far in as the Beach-end buoy, when it changes to *white* on a N.E. bearing, and so continues up the harbour, except in the direction of the North Shelf buoy, which is struck by a narrow strip of *red* light.

A *fixed green* light is shown from the head of the jetty at Landguard fort.

Felixstowe Pier and Light.—A pier, 608 feet long, and having 16 feet depth at low-water spring tides at its outer end, projects from the shore of the harbour half a mile to northward of Landguard fort. The head of the pier is marked by a *fixed red* light.

Harwich Church.—From the approach to Harwich harbour, the buildings in the town are very prominent, the principal one being the church dedicated to St. Nicholas; it was erected in 1821 to supersede an ancient structure, and is of white brick with stone buttresses. The chimney of the cement works at Dovercourt is a very plain mark.

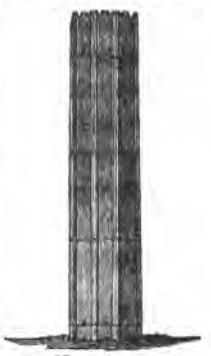
Harwich Lighthouses, built of brick and painted white, stand on the south side of the town, 218 yards apart, in a N.W. by N. and S.E. by S. direction; one is 80 feet and the other 37 feet in height from the ground. The lights from these towers have been discontinued for some years in consequence of the extension of Landguard point to the south-westward.

Another plain object is a circular redoubt on an artificial mound between the town and Beacon cliff.

DOVERCOURT LIGHTS.—Cliff succeeds to the south-west of Harwich, and slopes gradually down to the opening into Hamford water, 4 miles from that town. This shore is backed by a gently undulating country, with Dovercourt church, much obscured by wood, upon the outline. On the shore abreast the village are Dovercourt lighthouses, white, octagonal, standing on piles, and 208 yards apart; both exhibit *fixed white* lights. The higher light is elevated 45 feet above high-water, and is visible at the distance of 12 miles between the bearings N. $\frac{1}{8}$ W. and W. by S.; on the latter bearing it marks the northern edge of Cutler shoal, and the south spit of Whiting bank. The lower light is 27 feet above high-water; a *bright* sector is shown between the bearings N.W. by W. and W. by N. $\frac{1}{4}$ N., but the light is visible between the bearings West and N.W. $\frac{1}{2}$ N.; from these bearings the light gradually fades out. These

lights in line, one above the other, (when they show bright,) bearing N.W. by W. ½ W., lead into the Rolling ground between the Andrews and Inner Ridge buoys, but nearer to the latter than to the former.*

NAZE, indifferently termed Walton or Harwich Naze, on the south-east side of Hamford water, and S.S.W. ¾ W., 4 miles from Landguard point, is a cliff of a similar character to that at Bawdsey. A tall brick tower, 88 feet high, stands upon the summit of the Naze a little within the brink of the cliff; it was built by the Trinity House as a sea-mark. Walton hall, and a remarkable fan-shaped tree just to the westward of the tower, are used with the latter as marks for Goldmer gatway.



Naze tower.

The village of Walton-le-Soken, one mile to the south-west of the tower, is seated in a dip of the cliff; it is resorted to as a watering-place, and there are several handsome terraces, with a jetty for the accommodation of visitors. A branch of the Great Eastern railway has been extended to it.

HARWICH, a town of great antiquity, stands upon the north part of a peninsula formed by a bend of the river Stour; it has derived its importance from its noble harbour, which is the only safe one between the Humber and the Thames; the bottom is clean, with good holding-ground; the depth into it, formerly 11 feet only, has been increased by dredging to 17 feet at low-water, and it is capable of holding a large fleet. Edward III. sailed from it to gain his noted victory over the French at Sluys, and it is besides associated with many important events in English history.†

At the beginning of the century Harwich was in a flourishing state, owing to the strong garrisons maintained in the town and at Landguard fort; to a thriving fishery; to the works carried on in the Government dockyard; and to its being the rendezvous of the sailing packets which performed the mail service to the north of Europe; but after the establishment of peace, the fishery, which in 1778 had been worked by 78 vessels of 40 tons, employed only 10 vessels; the Government works were discontinued, and in 1832 the mail packets were removed to the Thames.

The entrance to the harbour has undergone striking changes since the Admiralty survey of it in 1804. At that time vessels sailed in through a narrow 7-fathoms channel close to the walls of Landguard fort; this continued without material alteration till 1826, when, in consequence of the removal of the ledge of cement stone which fronted Felixstowe, and with

* Staff Commander John Parsons, R.N., H.M.S. *Porcupine*, Survey 1873.

† *See* Admiralty chart of Harwich harbour, No. 1491; scale, $m = 10{\cdot}0$ inches.

that the obstruction to the passage of shingle to the south-westward, Landguard point gradually advanced, closed up the deep-water channel, and reduced the available depth into the harbour to 11 feet. In 1845, the attention of the Government having been directed to these circumstances, and to the impending ruin of this noble natural harbour, a stone breakwater, 508 yards long, was constructed from the foot of Beacon cliff outwards to confine the scourage of the stream to the navigable channel, and at the same time extensive dredging operations were entered upon, which have resulted in the obtaining a depth of 17 feet into the harbour at low-water springs. Experimental wooden groynes, for stopping the progress of the shingle to the south-westward, have also been formed at Felixstowe, and at Landguard beach nearly abreast the lighthouse; the latter work curves to the southward, its outer end terminating at the southern margin of the Andrews: it has already produced a beneficial effect.

A small inner harbour has been also formed on the north face of the town by building a pier in a north-west direction, with a transverse arm towards E.N.E. This pier is also the terminus of the railway from Harwich to London; and it partly covers in the Government dockyard (now held on lease for mercantile purposes), where vessels from the size of a 74-gun ship downwards were built during the continental war, and many fine merchant-vessels, up to 2,000 tons burden, have of late been built. The dockyard is now principally used for purposes of repair and refitting, and it is furnished with a patent slipway, capable of taking up a vessel of 400 tons.

In addition to the pier above referred to, the Great Eastern railway company have constructed one of larger dimensions, extending in a N. by E. direction for 450 feet from the west angle of the town; and from this a line of passenger and cattle steamers maintains communication with Rotterdam, Antwerp, and other continental ports. A *green* light is shown at the head of this pier.

Harwich, with the rapidly increasing suburb of Lower Dovercourt, is much frequented by summer visitors.

Vast quantities of cement stone, or septaria, dredged up from West rocks and the shoals in the neighbourhood, are exported from Harwich to London, and to various parts of the continent, a portion only of the stone being converted on the spot. The dredging vessels are about one hundred and fifty in number, and are each manned by a crew of four men.

The trade of Harwich, which from the reasons above stated has decreased so much of late years, bids fair to regain some of its ancient consequence. The port has been approved of as a warehousing port, as well as a packet station. There is now steam communication with Rotterdam and Antwerp; the foreign cattle trade is increasing, and likely to

become extensive; merchandise of most kinds is imported. The number of vessels belonging to Harwich on the 1st January, 1881, was 154, forming a total of 15,980 tons. The arrivals in 1880 were 1,434 vessels, of 363,770 tons. Population, 7,810 in 1881.

Supplies.—Marine supplies of every description are plentiful, and water is brought in from Upper Dovercourt; excellent water may likewise be obtained from the suburb of Lower Dovercourt; also from Shotley and Erwarton on the opposite side of the Stour. A steam-tug belongs to the port.

Vice-Consuls for most nations are resident.

A Life-Boat is stationed at Harwich.

IPSWICH, the chief town of Suffolk, is on the left bank of the Orwell, 9½ miles from Harwich harbour.* The river is navigable for sea-going vessels to as far as Ipswich, where it is first crossed by an iron bridge; and ¾ mile farther up it is connected by lock with the river Gipping, by which barges reach Stowmarket.

At high-water the Orwell possesses a breadth of half a mile, with well-wooded banks, which are studded here and there by villages, gentlemen's seats, and parks. For the first four miles above Harwich harbour the river has a good low-water breadth, then occurs Butterman's bay where are screw moorings and buoys, in 22 feet at low-water of spring tides, for the use of large vessels; the channel then gradually decreases in width and depth, and 3 miles farther there is anchorage in 15 feet at Mulberry Middle; from thence to Ipswich there is at present (1881) a depth of 7 feet at low-water, or 20½ feet at high-water springs.† The channel for 5 miles below Ipswich is well buoyed and beaconed, but it is for the most part narrow and tortuous. Several improvements have been made from time to time, among which may be mentioned the conversion of the bed of the river abreast the town into a wet dock, which was opened in 1842, and the formation of a compensating channel. Two extensive cuts for straightening the river were also made, and its bed was lowered by dredging. One of the results has been that the flow of a spring tide at the town, which in 1804 was only 6½ feet, has been increased to 13½ feet.

The Dock has an area of 33 acres, with 2,400 yards of frontage, about 1,300 yards of which are quayed, and a branch of the Great Eastern

* *See* Admiralty chart, Orwell and Stour rivers, No. 2693; scale, $m = 3{\cdot}8$ inches.

† At present, the upper portion of the river is adapted to vessels drawing 18 feet water, but the channel is in further process of deepening to correspond with the sills of the new entrance lock; and it is also intended to increase the depth of water in the dock to 23½ feet. From information furnished by Mr. Thomas Miller, C.E., Resident Engineer, Ipswich Dock Commission. *November*, 1881.

railway is led along it: the depth of water over the greater portion of the dock approaching the quays is 19½ feet at neap tides. A new entrance was completed in June 1881, the lock is 300 feet long between the gates, 50 feet wide, and has a depth of 23½ feet over the sills at high-water of ordinary springs. The old entrance, which is only 140 feet in length, is now disused.

Since the opening of the dock the trade of the port has much improved, and ships of a larger class use it. The principal trade is in corn, coal, and manures; it also receives spirits, wine, and timber, direct from abroad, for which it is a bonded port. There are large manufactories for agricultural and railway implements, flour and seed crushing mills, extensive breweries, and soap and cement works, as well as ship-building yards and repairing slips.

The shipping of Ipswich consisted on the 1st of January 1881 of 115 vessels of 9,103 tons. In 1880 the arrivals were 1,762 vessels of 138,426 tons. Population, 50,762 in 1881.

There are three steam tugs plying on the Orwell.

Pilots.—There are ten licensed pilots, who have two stationary vessels, one near the entrance of the river, and the other at Mulberry Middle.

MANNINGTREE and MISTLEY.—Manningtree is on the right bank of the Stour, 10 miles above Harwich. The Stour, taking its rise in the south-west corner of Suffolk, flows to the eastward past Manningtree, and unites with the waters of the German ocean at Harwich. It is navigable for river craft to as far as Sudbury, and it is crossed by a stone bridge at Cattawade, half a mile above Manningtree, and also by the Great Eastern railway.

From Harwich to Manningtree the basin of the Stour is nearly one mile wide, and is extensively occupied by mud-flats, which are intersected by numerous creeks. At low-water, the channel for 5 miles to Wrabness is broad and straight, when it suddenly becomes contracted, and so continues with a winding course to Manningtree.

Only vessels of light draught can reach Manningtree, and the principal place for shipping is at Mistley, three-quarters of a mile lower down on the same side, where is deeper water, and an extensive range of quays, warehouses, and granaries. The church at the latter place is a prominent object from the approach.

The navigation of the Stour is direct and simple to as far as Wrabness, but above that point the aid of a pilot becomes necessary. During springs, vessels drawing 12 feet reach Mistley, and those of 7 feet ascend to Manningtree. The trade is of the same character as that of Ipswich.

OUTER SHOALS.—The whole of the shore described on pages 208 and 209 is fronted by an extensive mass of rocky shoals, originally the basement of land which has been washed away. Those in the immediate approach to, and in, Harwich harbour will be first described, and afterwards the main body which are more in the offing abreast the Naze.

Felixstowe and Wadgate Ledges are rocky shelves or ledges projecting upwards of one mile to the southward from Felixstowe cliff with 3 fathoms at the outer part. Felixstowe ledge is marked by a *red* can buoy lying in 3½ fathoms with Mortella tower W., north-east of Bawdsey sea-mark, appearing between towers X and Y, bearing N.E. ½ N.; and Dovercourt church, in line with the flagstaff of Landguard fort, W. by N. The mark for the coasting track, the Cork land open of the Naze, leads outside them, and, while working, do not go into a less depth than 4 fathoms. The indifferent anchorage abreast is named Felixstowe road.

Platters, Andrews, and Beach End.—The immediate channel into Harwich harbour, through what are termed the Pitching and Rolling grounds, is bounded to the north-east by the Platters, Andrews, and Beach-end shoals, extending nearly continuously from Landguard point to the eastward. The Platters has 3 feet upon it; and Andrews spit, which is steep-to, 5 feet.

BUOYS.—These shoals are marked by the following buoys:—

Platters, *red* can, lies in 3 fathoms, on the south-eastern side of the shoal, with the western Mortella tower at Woodbridge haven, just open of Felixstowe cliff, bearing N.E. ¼ N.; and Erwarton church, over the high red-tiled storehouse in Harwich dockyard, N.W. ¼ N.; Andrews buoy, W. ¾ N., distant ½ mile; Inner Ridge buoy, W. by S. ½ S., $\frac{6}{10}$ mile; Cork light-vessel, E. by S., $1\frac{3}{10}$ mile; and Cutler buoy, E. by N., 4 miles.

Andrews, *red* can, lies in 22 feet, at the south-east extremity of the shoal, with the S.E. beacon on Landguard point, in line with the east side of Walton Mortella tower, bearing N. ¼ W.; Erwarton church, touching the north side of Harwich old high lighthouse N.W. ½ N.; Platters buoy, E. ¾ S., distant ½ mile; Inner Ridge buoy, S. by W. ¼ W., ¼ mile; and Beach-end buoy, W. by N. ¾ N., $\frac{8}{10}$ mile.

Beach-End, the extremity or toe of Landguard point, is marked by a *red* bell buoy, lying in 3 fathoms, with Walton east windmill, in line with the north-west beacon on Landguard beach, bearing N.E. ½ N.; and Dovercourt high lighthouse, open its width to the northward of the low lighthouse, N. W. by W. ¾ W.; Andrews buoy, E. by S. ¾ S., distant $\frac{8}{10}$ mile; Inner Ridge buoy, S.E. ¾ E., $\frac{9}{10}$ mile; Cliff Foot buoy, N.W. ¼ N., 2 cables; and North Cliff buoy, N. ¼ W., 5 cables.

CORK LEDGE, 1½ mile south-east from the Platters, bounds, with the latter shoal, what may be termed the outer gateway into Harwich harbour. The ledge is a patch of rock half a mile across, and with 10 feet upon it.

There is also foul ground lying outside the ledge; Cork knoll, or knot, is a patch with 3¼ fathoms upon it, E. by N. ¼ N., 1¼ mile from the ledge, shallow ground of 20 and 22 feet between them being nearly continuous; and Cork spit, having 18 feet upon it, lies in a north-westerly direction from the ledge, the northern part of it being W. by N. ¼ N., half a mile from Cork light-vessel.

CORK LIGHT-VESSEL.—In 1844, a light-vessel was placed in 4½ fathoms, to the northward of the northern end of the ledge, exhibiting at 35 feet above the water a *white* light, which *revolves every half-minute*, and may be seen in clear weather from a distance of 10 miles.

Fog Signal.—A gong is sounded during thick or foggy weather.*

The vessel lies with the cement-works chimney at Dovercourt, in line with Landguard light, bearing W.N.W.; and the south-west land, over Walton pier-head, well open of the Naze, S.W. by W. ¼ W.; Cutler buoy, E.N.E., distant $2\frac{3}{10}$ miles; Platters buoy, W. by N., $1\frac{3}{10}$ mile; Andrews buoy, W. by N., $1\frac{8}{10}$ mile; Outer Ridge buoy, W. by S. ¼ S., $1\frac{5}{10}$ mile; and Inner Ridge buoy, W. ⅛ N., $1\frac{8}{10}$ mile.

RIDGE is a rocky shoal abreast the inner part of the Platters, and W. ½ S. 2 miles from Cork light-vessel; it is half a mile long in a North and South direction, and one-quarter of a mile broad, with 9 feet upon it.

BUOYS.—The Ridge is marked by two buoys.

Inner Ridge, at its northern end, is a can with *red* and *white vertical stripes*, lying in 15 feet, with the east end of Wadgate grove, over the centre of Mortella tower Q. on Bull cliff, bearing N.N.E. ⅜ E.; and Dovercourt high lighthouse, its width open to the southward of the low lighthouse, N.W. by W. ¼ W.; Platters buoy, E. by N. ½ N., distant $\frac{6}{10}$ mile; Andrews buoy, N. by E. ¼ E., 2½ cables; and Beach-end buoy, N.W. ¾ W., $\frac{9}{10}$ mile.

Outer Ridge, *chequered red* and *white* can, lies in 15 feet at the southern end of the shoal, with the northern Mortella tower at Woodbridge haven, just open of the north-east end of Felixstowe cliff, bearing N.E. ⅜ N.; and Erwarton church, in line over the beacon at the end of the breakwater, N.W. by N.

HALLIDAY FLATS occupy all the outer portion of the deep bight between Harwich and the Naze; they are for the most part rock,

* *See* Regulations respecting light-vessels, foot-note, page 101.

several patches of which have 5 and 6 feet upon them; the north-eastern edge, extending from the Ridge north-west, afterwards trends more northerly towards Harwich harbour, and joins the Cliff foot.

Anchorages.—The approach to Harwich harbour from the eastward passes through the two outer anchorages, the Pitching and Rolling grounds, having the Platters and Andrews to the northward, and the Cork ledge and Ridge to the southward. The channel between the Andrews and the Ridge is about 750 yards wide, and in it the depth of 16 feet is likely to be passed over; it leads directly to the entrance of the harbour between Landguard beach and Cliff-foot rock. Anchorage may be taken in the Pitching ground in 5 or 6 fathoms, with Orford castle, open of Bawdsey cliff three times the distance between the church and castle, bearing N.E. $\frac{2}{3}$ E.; and Cork light-vessel, East, southerly. In the Rolling ground, anchor in from $4\frac{1}{2}$ to 6 fathoms, with the outer end of the groyne and the S.E. beacon in line, N.N.E. $\frac{1}{4}$ E; and Harwich old low lighthouse, midway between the church and old high lighthouse, N.N.W. $\frac{1}{4}$ W.

HARWICH HARBOUR SHOALS.—Beach-End is the toe or under-water projection of the beach at Landguard point; it extends S.W. $\frac{1}{2}$ W., about 4 cables from the high-water extremity of the point. Beach-end bell buoy has been already noticed.

Cliff Foot Rock, 2 cables across, and with 4 feet over it at low-water, lies directly off Beacon cliff.

Buoy.—Cliff-foot rock is marked to the south-eastward by a conical buoy, *chequered red* and *white*, with staff and cage, in 18 feet, bearing N.W. $\frac{1}{4}$ N., 2 cables from Beach-end buoy.

The channel between Cliff-foot buoy and the Beach-end or toe of Landguard point is only one cable wide, and forms the inner gateway or immediate entrance into Harwich harbour.

A Breakwater, 508 yards long, and marked at its outer end by an iron staff and globe, extends south-east from Beacon cliff towards Cliff-foot rock; it was constructed for the purpose of concentrating the scour of the tide stream upon Landguard point, in order to check the further extension of the beach to the south-westward.

Buoys.—Up to a recent date there were several shoals in Harwich harbour, namely, the Altar, Cod, Glutton, Bone, Gristle, and Guard; but these have been either wholly or in part removed by dredging, and some of the buoys which marked them have been removed; it is, consequently, no longer necessary to make the distinction of Eastern and Western channels. Four buoys, however, lie along the outer part of the Guard, or Harwich shelf, as it is sometimes called, viz.:

North Cliff, can, *striped vertically red* and *white*, in 18 feet.

South Shelf, *chequered red* and *white* can, in 16 feet.

North Shelf, can, *striped vertically red* and *white*, in 16 feet.

Guard, a *chequered red* and *white* conical buoy, with staff and cage, in 24 feet.

The above four buoys, as well as that upon Cliff-foot rock, must be left on the port hand in entering.

Shotley Spit, can buoy, with *red* and *white horizonal stripes*, in 16 feet, marks Horse bank at the extremity of Shotley point.

Directions for Harwich Harbour.—Approaching from the eastward, and having arrived abreast the Cutler, with Orfordness low lighthouse open to the eastward of the high lighthouse, and Cork light-vessel bearing W. by S. southerly, distant 3 miles, close her on that bearing, and pass close to the northward of her; then bring the light-vessel E. $\frac{3}{4}$ S. while proceeding through the Pitching ground to between the Andrews and Inner Ridge buoys, and when Dovercourt lighthouses appear in line, N.W. by W. $\frac{1}{2}$ W., keep them so, and it will lead through the Rolling ground up to Beach-end buoy. Having arrived abreast the buoy, round gradually to the north-eastward between Beach-end and Cliff-foot buoys, and afterwards keep from one to two cables off the Suffolk shore until the beacons on Landguard point appear in line, bearing S.E. southerly, which mark will lead between Gristle and Guard shoals, with 15 feet least water, and when the Guard buoy has been passed take up an anchorage northward of the town. The best berth is with Harwich church, bearing South, one cable off the pier, in 5 fathoms at low-water; but the channel of the Stour for several miles up affords excellent and secure anchorage.

LIGHT.—In order to facilitate the approach to the anchorage off the town, and to leave a clear passage for steam-vessels to the piers, there is exhibited at the end of the North jetty a small dioptric light which shows *red* between the bearings West and W. by S. $\frac{3}{4}$ S.; and vessels are cautioned not to anchor within the limits of this *red* light unless they are to the eastward of the *red* light which is shown from Landguard lighthouse, cutting North Shelf buoy. The northern limit of this exempted anchorage may be known in the daytime by bringing Upper Dovercourt church, open north of the railway pier, bearing W.S.W.

In scant south-westerly winds, the leewardly round along the Suffolk shore may be avoided by steering from a midway position between Beach-end and Cliff-foot buoys, the same distance to the eastward of the other buoys, until the two *red* spar-beacons with circular tops, standing

on the beach within Landguard fort, appear in line, bearing S.E. southerly. The beacons, which are, respectively, 31 and 36 feet high, and 245 yards apart, should not be opened to the southward, as Harwich shelf is steep-to; there are 14 and 13 feet over the Gristle and Bone at low-water springs.

The deepest and widest channel is between the Bone and the Suffolk shore, but marks for this cannot be given.

Working.—Standing to the northward towards the Andrews, tack when Dovercourt high lighthouse is open thrice its breadth to the northward of the low lighthouse, and towards the Inner Ridge and Halliday flats by the lead. In the channel between the Beach-end and Cliff foot, and when standing towards the Suffolk shore, the lead is not sufficient guide. Afterwards, working towards Harwich and standing to the southward, tack when the beacons are in line. Shotley flat may be closed until Walton east windmill appears over Mortella tower (N.), bearing E. $\frac{1}{4}$ S.

Rounding Shotley point, in order to pass from the Stour into the Orwell, keep the summit of the old high lighthouse on with the east part of Harwich church, bearing S.S.W. $\frac{1}{3}$ W.; this mark clears Horse bank in 15 feet at low-water.

By Night.—Close with Cork light bearing W. by S. southerly; pass to the northward of the light-vessel, then keep the light E. $\frac{2}{3}$ S. until Dovercourt lights appear in line, bearing N.W. by W. $\frac{1}{2}$ W. Running in upon this line, Landguard *red* light will first appear shortly after the Andrews and Inner Ridge buoys have been passed, and when it changes to *white* at Beach-end buoy, bring the vessel's head round to the northward and north-eastward, and anchor under Landguard fort.

CAUTION.—The ebb-stream sets strongly to the eastward across the Andrews and Landguard point shoals, and to the S.S.W. across Cliff-foot rock; some care is, consequently, necessary, to guard against it in light winds.

TIDES.—It is high-water, full and change, in Harwich harbour, at 0h. 6m.; springs rise 11$\frac{1}{2}$ feet, neaps 9$\frac{3}{4}$ feet, and neaps range 8 feet. At Pinmill, it is high-water at 0h. 20m.; at Downham reach, at 0h. 27m.; and at Ipswich, at 0h. 35m. Spring tides rise 12 feet at Pinmill, 12 feet at Downham reach, and 13$\frac{1}{2}$ feet at Ipswich dock.

It is high-water, full and change, at Wrabness, at 0h. 29m. (23m. later than at Harwich); at Mistley quay, at 0h. 48m.; and at Cattawade bridge, at 1h. 8m. Springs rise 12 feet at Wrabness, 11$\frac{3}{4}$ feet at Mistley quay, and 4$\frac{1}{4}$ feet at Cattawade bridge.

HAMFORD WATER is a natural harbour or inlet at the head of the bight between Harwich and the Naze. Within Walton Stone point,

which bounds the entrance to the southward, the water space divides into two main branches, running to the southward and westward, and named, respectively, Walton channel and West water; numerous creeks diverge from them, running between islets and low embanked marshes, which have been gradually gained from the sea.

Hamford Water is available in north-easterly gales for small vessels which have lost their anchors, and are unable to fetch into Harwich harbour. A proper attention to the directions to be given, will enable the seaman so circumstanced to enter Hamford water without difficulty, and he may run his vessel upon the mud when inside without her sustaining any injury.

The coast-guard vessel is hauled up on Walton Stone point. Vessels discharge cargoes in West water into barges for Oakley, Beaumont, Kirby, and Walton, where are places for unloading, and also for the shipment of corn for the London market.

The approach to Hamford water is over Halliday flats, and the channel is between Pye sand and a broad shelf from the main, both of which dry at low-water; between these there is but 4 feet water, and the channel when near Walton Stone point is but 100 yards in width. The least water, 4 feet, is 2 miles below Walton Stone point; when inside Pye sand it deepens to 5 and 7 fathoms.

Directions.—From the inner part of the Rolling ground, steer to the westward until Felixstowe and Landguard points are in line, bearing N.E. by E. ½ E. This mark leads over the flat of 4 feet to within the point of Pye sand; the channel must now be kept by steering a little to the left of Duckmore creek beacon, and by observing the ripple on the edge of the banks on either side.

NAZE FLATS and CHANNELS.—The shoals to the southward of Harwich, embraced by the collective term Naze Flats, are Pye sand, Naze ledge, Stone banks, Cork sand, and West rocks; having between them the narrow and somewhat intricate passages, Medusa, Inner, and Gullet, channels, often used by vessels coasting alongshore, or passing from or towards Harwich harbour.

PYE SAND, already mentioned as forming the south-east side of the channel into Hamford water, extends from Walton Stone point N.E. by E. ½ E. for 1⅝ mile, its north-east end being S.W. by W., 1¾ mile from Landguard point. This sand dries at low-water.

NAZE LEDGE, or flat, shelves gradually out for one mile from the Naze, with 8 to 9 feet upon the outer part of it. There were formerly patches of stone named the North, Middle, and South bars upon the north side of Naze ledge, but they have been removed of late years by the cement-stone dredgers.

STONE BANKS lie out 1½ mile to the eastward of the Naze, and are composed of a mass of rock and loose stones one mile across each way, with several patches of 6 feet.

Buoy.—For the use of vessels passing through Medusa channel, of which Stone banks are the eastern boundary, a can buoy, with *red* and *white vertical stripes*, lies at the south-west part of the banks, in 15 feet at low-water; with Harwich church, appearing between Harwich old lighthouses, bearing North.

CORK SAND.—Three fathoms upon its north-east end, is S.E. ¼ E., one mile from Cork ledge; thence it extends S.W. ¼ S. for 2½ miles, and joins the north-west end of West rocks; it is very shoal throughout, having several ridges dry at low-water.

Buoy.—A can buoy, with *red* and *white vertical stripes*, lies on the north-east end of Cork sand, in 3½ fathoms; with Mortella tower T., at the entrance of Woodbridge haven, its width open to the right of Ramsholt church, bearing N. ¼ E.; Harwich church, open to the left of Landguard fort, N.W ½ W.; Cork light-vessel, N.W. by N., distant 1⅔ mile; and Cutler buoy, N.E. ¾ N., 3 miles.

WEST ROCKS, the outermost of the group, and from whence great quantities of cement stone are every year removed by dredging, extend in a N.W. and S.E. direction, and are 2½ miles long and one mile broad. The body of these rocks has a depth of one to 5 feet at low-water; 9 feet depth upon their outer end, is about E. by S. ½ S., 5¼ miles from the Naze tower.

Buoy.—West rocks are marked to the south-eastward by a *black* cylinder, lying in 3¾ fathoms, with Harwich old high lighthouse, open its width to the westward of the old low lighthouse, bearing N.N.W. ¾ W.; and the Naze tree, appearing midway between the Naze tower and Walton hall, W.N.W.; Lower Rough buoy, N.E. by N., distant 3$\frac{1}{4}$ miles; and Gunfleet N.E. buoy, S.W. ¼ W., 2¼ miles.

MEDUSA CHANNEL, deriving its name from an incident in Nelson's history, is used by vessels passing from Harwich into the Wallet, or *vice versâ*; it lies between Halliday flats and Naze ledge to the westward, and the Ridge and Stone banks to the eastward; the least depth at low-water is 10 feet, but it is narrow and indirect.

Directions.—From the Rolling ground, bring the outer house on Landguard point on with Walton Mortella tower, bearing N. ¾ E., which mark directs between Halliday flats and the Ridge. When within one mile of Stone banks buoy, the Cork land, or Burnthouse cliff, will appear outside the Naze, bearing S.W. ¾ W. The latter mark kept on for a short distance

will lead through the narrowest part of the channel; then steer close past the west side of the buoy, and continue onward one mile farther, when a course may be taken either up the Wallet, or for Goldmer gat.

INNER CHANNEL, the common coasting track of vessels proceeding from Hollesley bay to the south-westward in off-shore winds, so as to avoid the round by the Lower Rough and West rocks, is between Felixstowe ledge, the Platters, and the Ridge to the north-west, and Cork ledge and Stone banks to the south-east.

Burnthouse cliff, open of the Naze, bearing S.W. $\frac{3}{4}$ W., will lead clear of all dangers from abreast Woodbridge haven to nearly up to Stone banks, when the vessel must be kept to the westward, and the directions for Medusa channel followed.

GULLET CHANNEL, one cable wide, is the passage between Stone banks and West rocks; it has a hole of 5 to 7 fathoms in it, with 7 to 9 feet on either side of the passage. From abreast Cork light-vessel, and passing to the westward of Cork sand, Alderton rectory (a large red house, difficult to see in the wood), showing over the west end of Bawdsey cliff, bearing N.N.E. $\frac{3}{4}$ E., leads to it, but the channel is too narrow to be recommended, except in a case of extremity.

GOLDMER GAT, the passage between West rocks and the north-east end of the Gunfleet, and connecting the Wallet and East Swin, is often used by vessels in easterly and westerly gales seeking the shelter of West rocks or the Gunfleet. Its breadth is about $1\frac{1}{2}$ mile, over a considerable portion of which there are from $4\frac{1}{2}$ to 6 fathoms, decreasing towards the shore; the conical buoy, *striped horizontally black* and *white*, with staff and diamond, upon the north-east end of the Gunfleet, marks the channel to the south-west.

Anchorage.—The best anchorage within the gatway in heavy weather is with the Naze tower bearing N. $\frac{3}{4}$ E., and Clacton church W. by N. $\frac{3}{4}$ N.; here there is protection with the wind from West, round northerly, to S.E., which is partly afforded by the Gunfleet abreast drying at half-ebb.

Directions.—The leading mark is the Naze tower and tree in line, bearing N.W. $\frac{3}{3}$ W. In working, the Naze tower and Walton hall in line, N.W., will clear the Gunfleet in 20 feet; and the new mill, in line with the south end of the terrace of Walton-le-Soken, bearing N.W. by W. $\frac{3}{4}$ W., will clear West rocks.

CHAPTER VIII.

NAZE TO THE NORE.

VARIATION, 17° 35′ West, in 1882.

The WALLET, a broad channel between Gunfleet sand (described on page 230), and the shore of Essex,* beginning abreast the Naze and ending abreast the Colne, is 12 miles long, and its breadth decreases from about 4 miles at its eastern end to 3 miles at its western end. It is commonly used by vessels bound to Colchester or Maldon, and by those pursuing an in-shore coasting track, which find an outlet by the Spitway.

The COAST.—Cliff continues from Walton-le-Soken to the south-west; at the distance of 1½ mile, and near its brink, are Frinton Hall farm and Frinton chapel, the latter a small building with a belfry, and partly overgrown by ivy; then, for the same distance, the shore is low, and backed by an undulating country. On the highest part of it, Great Holland church, with a square tower and surrounded by wood, is prominent.

CLACTON-ON-SEA.—Beyond the low shore just noticed, there is cliff for 3 miles; the eastern portion of which is known as Holland cliff, and that to the westward as Clacton cliff; Clacton-on-Sea, and Mortella tower, No. 6,† stand upon the latter, and Clacton church with a stunted spire is a little in the rear.

Pier and Light.—A pier extends out from Clacton-on-Sea, its head being marked by a *fixed red* light.

A Life-Boat is also stationed here.

From Clacton cliff, low beach extends to the mouth of the Colne with Mortella towers occurring at intervals along it. The village of St. Osyth and its ruined priory, and Brightlingsea church with a tower, and chapel with a spire, are all marked objects on the well-wooded background.

MERSEA ISLAND, situated between the mouths of the Colne and Blackwater, is 4 miles long, and low and wooded; the tower of East Mersea church, with a turret at one corner, and



East Mersea church.

* *See* Admiralty chart of the river Thames, sheet 1, Kentish Knock and the Naze to West Swin, No. 1975; scale, mile=1·4 inch. Also, England, East coast, North Foreland to Orfordness, including the entrance to the Thames, No. 1610; scale, mile=0·5 inch.

† The numbers to the Mortella towers are for reference in the first of the above charts.

West Mersea church, a plain white-washed structure, show conspicuously near the east and west extremities of the island.



West Mersea church.

SALES POINT, on the south side of the entrance to the Blackwater, is low; the ruined chapel of St. Peter stands one mile to the southward of it; the remainder of the shore to Shoeburyness consists of low embanked lands, scarcely visible from the main navigable channel abreast.

SHOALS.—The bottom of the Wallet shelves irregularly from the shore to the north-west side of the Gunfleet (which is unbuoyed), and it is in general foul for nearly one mile off shore; the following shoal patches occur:—

COPPERAS GROUND, with 8 and 11 feet upon it, lies one mile out from Frinton chapel. The Naze tower, bearing N. by E. $\frac{3}{4}$ E., and No. 6 Mortella tower, West, clear its south-east and south sides.

TRIPOD, abreast the middle of Clacton cliff, and three-quarters of a mile off shore, is a small bank of shingle with 6 feet upon it.

Holland gap, formed between Holland and Clacton cliffs, bearing N. $\frac{3}{4}$ E., clears its east side; and the Marsh tree (round and prominent), standing between Lion point and Eastness, kept open to the westward of No. 4 Mortella tower, bearing W. by N. $\frac{3}{4}$ N., will lead to the southward of it.

RUNCH is abreast Eastness, $1\frac{3}{4}$ mile off that point, and S.W. $1\frac{3}{4}$ mile from the Tripod, and lies nearly midway across the Wallet; it is only 2 cables in length, has 16 and 18 feet upon it, and 20 to 24 feet about it.

COLLIER is also abreast Eastness, being two-thirds of a mile from the shore and within the Runch; it consists of one large and several small patches, 4 cables in extent, with 4 feet least water upon them. Mortella tower No. 6, bearing N. $\frac{3}{4}$ E., and Colne point, N.W. by W. $\frac{1}{2}$ W., clear it to the eastward and south-westward.

PRIORY SPIT, the outer extremity of the foul ground projecting between Eastness and Colne point, has 9 to 11 feet upon it; it is $1\frac{1}{2}$ mile to the eastward of the entrance to the Colne, and nearly midway between the Collier and Eagle. When abreast it, the tower of St. Osyth priory and Mortella tower No. 3 will be in line, bearing N. $\frac{1}{2}$ W. East Mersea church, kept open of Colne point, N.W., clears its south-west side.

Buoy.—A *red* can lies in 12 feet at the spit end, with the tower of St. Osyth priory and Mortella tower No. 3 in line, bearing N. $\frac{1}{2}$ W.

There are several other patches at the head of the Wallet, but they will be embraced in the description of the Colne and Blackwater.

SPITWAY, the passage connecting the western or upper end of the Wallet with East Swin, is 12 miles from Goldmer gat, and abreast of and 3½ miles from Eastness; it passes between the Gunfleet and the Buxey, and is three-quarters of a mile through, with 9 feet at low-water springs in the middle of the channel.

BUOYS.—The following buoys lie on the west or Buxey side of the Spitway.

Wallet Spitway, a conical buoy, *striped red* and *white horizontally*, with staff and St. Andrew cross, lies in 24 feet; with Brightlingsea church tower, in line with a dark-coloured house on the beach, bearing N. by W. ½ W.; a white cottage, its width open to the eastward of St. Osyth priory, N. by W.; Clacton pier-head, in line with a gable of a red-brick house, N.N.E. ½ E.; and Swin spitway buoy, S. by E., distant one mile.

Swin Spitway, *black* bell buoy, lies in 18 feet, with the body of St. Osyth church, in line with a small white house, bearing N. ¾ W.; and Great Clacton church, in line with the middle of Clacton pier, N. by E. ¾ E.; Sunk light-vessel, E. by N., distant 15 1/10 miles; and Swin Middle light-vessel, S.W. 3 9/10 miles.

Directions for the Wallet and Spitway.—As the obstructions in the Wallet lie for the most part within one mile of the shore, but few directions need be given. Keep 1½ mile off, and, if working, in standing towards the Gunfleet tack on the first shoal cast, as that sand is steep-to. From abreast the Naze, the course up the Wallet is, first S.W. by W. ¼ W., and then W. by S. ½ S. southerly, but the former course should be continued if bound through the Spitway. In passing through the latter channel keep a short distance to the eastward of the buoys, but should they be out of position, St. Osyth church well open to the eastward of No. 3 Mortella tower will lead through. In passing through the Spitway from the Swin, the Wallet will have been entered when the Naze tower becomes shut in upon Frinton cliff, and a course may then be shaped for Colne bar or the body of the Wallet.

CAUTION.—The flood-stream sets strongly across the north-east end of the Gunfleet into the Wallet, and W.N.W. through the Spitway, but more northerly during the latter part of the tide. The ebb-stream sets obliquely across the inner side of the Gunfleet.

Anchorage.—Besides the shelter afforded by West rocks in easterly gales (as noticed on page 222), there is also well-sheltered anchor-

age in every part of the Wallet in gales off-shore, as well as in those from S.W. to S.E.; for the high sands which bound it intercept all weighty sea, and it becomes comparatively smooth at two hours' ebb. The precaution should, however, be adopted of giving a good scope of cable on first taking up a berth, for, as the bottom is stiff clay, the anchors become shod, and will seldom hold again after they have once started.

RIVER COLNE rises in the north-west part of Essex, and after a course of 32 miles, the latter portion of which is, for several miles, between extensive flats and detached banks, joins the sea near Colne point. Many obstructions exist in it; the tide is nearly throttled by the overlapping projections, Hound point and Ooze end, and the navigable state of the river has been considered subordinate to the purposes of the oyster fishery, the outer limits of which are Colne point and Rams hard, the latter 2¼ miles above Brightlingsea. The oysters are deposited on the bed of the stream, and the result has been that the river has materially lost in depth, and vessels are frequently detained in consequence.

BRIGHTLINGSEA, which is connected by a branch line with the Great Eastern railway, is a short distance up a creek of the Colne opposite the east end of Mersea island. It is known as the head-quarters of numerous small fore-and-aft vessels engaged in the oyster fishery, dredging for cement stone, and in the salvage of vessels which have been wrecked in East and West Swins.

WIVENHOE, upon the left bank of the Colne, 3 miles below the Hythe, may, from its superior facilities, be considered the port of Colchester; vessels drawing 15 feet being able to reach it on spring tides. Moorings are laid down for twelve single berths, where vessels discharge into lighters; the bottom is mud and gravel, but nearer the town it is hard.

Supplies of all kinds may be readily obtained here, including good spring water. Several noted yachts have been built in a yard at the upper end of the town.

COLCHESTER, upon the right bank of the Colne, 8 miles above Brightlingsea, dates from a very early period, having been among the first of the Roman settlements, and it was celebrated during several centuries for the manufacture of baize and serge originally established by some expatriated Flemings, but this branch of industry decayed, and is now extinct; the general trade of the port has also suffered from various causes.

The usual shipping place is named the Hythe, and vessels drawing 11 feet can reach it at spring tides. A branch of the Great Eastern

railway was led down to it in 1848. Several schemes have been proposed for converting this portion of the Colne into a floating basin, and improvements have been carried out, several points which obstructed the tidal flow having been cut off and the channel deepened below the Hythe.

Colchester imports timber, and exports corn and malt; 229 vessels of 8,427 tons belong to it, besides numerous smaller craft sailing from Rowhedge, Wivenhoe, and Brightlingsea, but its trade is comparatively unimportant. One shilling is levied by the corporation of Colchester on each vessel anchoring in the Colne. Population, 28,395 in 1881.

Pilots.—There are 4 licensed pilots for the Colne, who board at the Watch-vessel, and fishermen well acquainted with its pilotage may also be procured by hoisting the usual flag.

SHOALS at the ENTRANCE to the RIVER COLNE.—The entrance to the Colne is between the following detached banks and shoals:—

KNOLL is a long narrow ridge on the north-east side of Dengie flat, which fills up the whole of the space between the Blackwater and Crouch. The Knoll is very shallow throughout, and a portion of it dries one foot.

BUOYS.—Knoll.—The south-east end is marked by a conical buoy, *striped vertically red* and *white*, with staff and cage, lying in 13 feet, $2\frac{1}{2}$ miles from Colne point; with Great Clacton church, on with the black gable-end of a farm-house, bearing N.E. $\frac{3}{4}$ E.; and Brightlingsea church, in line with a white house (called My Lady's), N. $\frac{1}{4}$ W.

N.W. Knoll.—At the north-west spit is a can buoy, *striped red* and *white vertically*, in 24 feet, with Brightlingsea church, well open west of High clump, bearing N. $\frac{3}{4}$ E.

EAGLE is half a mile to the northward of the outer extremity of the Knoll, and between them is the principal entrance into the Colne. The Eagle is $1\frac{1}{2}$ mile long in a W. by N. $\frac{1}{2}$ N. and E. by S. $\frac{1}{2}$ S. direction, and half a mile broad; its west end is very shallow, one part drying; the depths over the remaining portion vary from 2 to 12 feet.

BUOYS.—North Eagle, can, *chequered red* and *white*, lies in 5 fathoms, near the northern elbow of the Eagle, with Brightlingsea church tower, its width open west of a long red-tiled barn, bearing N. $\frac{1}{2}$ W.; North side of No. 6 Mortella tower, touching south side of No. 5 tower, E.N.E.; Priory spit buoy, E. by S. $\frac{1}{2}$ S., distant $1\frac{1}{2}$ mile; Bar buoy, W. $\frac{3}{4}$ N., 9 cables.

Eagle, a *red* can buoy, lies on its south-west side in 12 feet, opposite to, and bearing N. by W., nearly half a mile from, the Knoll buoy; from it,

the black coast-guard house, to the westward of Clacton cliff, is in line with No. 6 Mortella tower, bearing N.E. by E. ¾ E.; and Brightlingsea church is just open to the westward of Mortella tower No. 2, N. ¼ W.

COLNE BAR extends S. ¾ W. for 1½ mile from Colne point, and is separated from the Eagle by a channel one-third of a mile wide, named Eagle deep. The bar has an average depth of 2 to 5 feet, with some dry patches near to Colne point.

Buoy.—Colne bar is marked near its outer end by a *red* conical buoy, in 30 feet, bearing N.W. ½ N., three-quarters of a mile from the Eagle buoy, with Mortella tower No. 5, just to the eastward of Mortella tower No. 4, bearing E. by N. ½ N.; and Brightlingsea church, in line with the west end of Brightlingsea wood, N. ¼ E.

Traders to and from Colne river usually pass over Colne bar shoal when there is a sufficient flow of tide, and hence this obstruction has obtained among them the inaccurate name of Colne bar.

BENCH HEAD is on the opposite side of the river, abreast Colne point, being the outer point of Mersea flat, a dry and shallow track caused by the confluence of the Colne and Blackwater. The shoal extends about S.S.W. for one mile, and then S.W. by W. for 4 cables, and has from one to 6 feet upon it, while there are 7 and 9 feet on the flat about it.

Buoys.—A can buoy, *striped red* and *white horizontally*, lies on the south-east tail of the flat in 24 feet.

A *white* buoy, marking one of the limits of the oyster fishery, lies just to the eastward of the inner end of Bench head.

Shoal.—Farther in, the channel of the Colne runs nearly straight in a northerly direction; it has become narrower, and in the middle, half-way from the white buoy to the entrance of Brightlingsea creek, lies a shoal with 12 feet water over it.

Directions.—The passage into the Colne between the Eagle and the Knoll bears N.W. ¾ W., 2¾ miles from near Wallet Spitway buoy, and has an irregular width of 3 to 4 cables, with depths from 9 to 14 feet. The leading mark through is, Barn hall (a house standing high upon the outline), in line with the west point of Mersea island, bearing N.W. ½ W.; but as Barn hall is a very distant object, and can be seen only in clear weather, the buoys will be the best guide. Pass in mid-channel between them; when through, the water quickly deepens to 6 and 7 fathoms, and the Bar buoy will bear N.N.W. ¼ W. three-quarters of a mile. If entering to the northward of the Eagle, East Mersea church, open of Colne point, bearing N.W. (northerly), leads between the Eagle and Priory spit, and when the water deepens, keep away to the westward till Mortella towers

Nos. 4 and 6 appear in line bearing about E. by N. $\frac{3}{3}$ N., which is the leading mark through Eagle deep; pass outside the Bar buoy.

From abreast the Bar buoy, the leading mark into the Colne up to as far as the *white* (fishery) buoy near the inner part of Bench head, is, Brightlingsea church, in line with, or just to the eastward of, Mortella tower No. 1, bearing N. $\frac{3}{4}$ E.; it passes over a tail of 12 feet at low-water.

Working into or out of Colne river, Brightlingsea church must only be brought in line with Mortella tower No. 1, while standing to the westward, and very little open when standing to the eastward, as the channel is but one-quarter mile wide.

The mid-channel mark from Bench head to Mersea island is, Wivenhoe mill, in line with the gap in Aldborough wood, bearing N. $\frac{1}{2}$ W. As above remarked, a 12-feet shoal lies in the fairway.

Anchorage may be taken up abreast the mouth of Brightlingsea creek, a little to the eastward of the Excise watch-vessel.

TIDES.—It is high-water, full and change, at Colne point, at 12 o'clock, and at Wivenhoe at 0h. 10m.; at Colne point springs rise 14 feet, neaps 10 feet, and neaps range 6 feet; while at Wivenhoe they rise 15 and 10 feet, respectively, and the range of neaps is 6 feet.

BLACKWATER, having a common outlet with the Colne, rises in the north-west corner of Essex. At Maldon, 32 miles below its source, it is joined by the Chelmer, and then enters a broad estuary, the outlet of which is 10 miles lower down abreast Mersea island. For 5 miles above Sales point on the south side of the entrance, the low-water capacity of the Blackwater is considerable; the channel then becomes narrow and tortuous, and the upper part of the estuary is nearly wholly occupied by broad flats, and Osea and Northy islands.

MALDON, upon the right bank of the Chelmer at its junction with the Blackwater, is, like Colchester, of great antiquity, and probably had a similar origin. Its earliest records bear the date of 913, when King Edward encamped near it to oppose the Danes.

Maldon had a fair trade up to 1794, when a canal was formed to connect Collier reach, 1½ mile below the town, with the Blackwater at Heybridge, which had the effect of diverting the trade to the latter village. The basin of the canal is three-quarters of a mile long; the gates are 26 feet wide, and vessels of 12 feet draught enter it during springs; they discharge their cargoes into barges of 25 tons burden for conveyance into the interior.

Maldon is connected by railway with Chelmsford. 140 vessels of 8,583 tons belong to the port, (including Burnham,) and those drawing 9 feet

[illegible] is an oyster fishery. The trade is of a similar character to that of Colchester. In 1886, the arrivals were [illegible] vessels of [illegible] tons. Population, [illegible] in 1881.

Directions.—The directions for the Colne (pages 288, 289) are applicable to the Black water as far as the Ile and Knoll buoys; thence the Black water extends north-westerly to as far as Sales point. No mid-channel mark can be given, but, when working, tack on Mersea flat side before Rara hall becomes shut in over the west end of Mersea island, and when that mark is no longer of any use, tack when Tollesbury church appears in line with the packing house (a small wooden shed standing upon shingle point), bearing W. by N. ½ N. No marks can be given for the Knoll side of the channel, but it is necessary to remember that the flood streams sets outward across the outer end of the Knoll, and inward across its inner end.

Pilots.—Having arrived above Sales point, anchor and procure a pilot. There are six licensed pilots, but they do not go lower down than Osea island, except in answer to signal.

TIDES.—It is high-water, full and change, at Sales point, at 12h. 0m.; at *Heybridge haven*, at 0h. 20m.; and at Maldon, at 0h. 32m. Springs rise 14¾ feet at Sales point, 12 feet at Heybridge basin, and 10 feet at *Hythe wharf, Maldon*. Neaps rise 10 feet, 8 feet, and 6 feet; and range 5½ feet, 4 feet, and 2 feet, respectively.

EAST SWIN.

East Swin, or King's channel, the lower portion of the north-eastern approach towards the Thames, begins abreast the north-eastern end of the *Gunfleet*; here the channel is confined between extensive sand-banks, and, as the shore is distant and low, and no sailing marks can be given, the navigation depends upon correct courses and distances, the bearings of light-vessels and buoys, and a careful attention to the sets of the tide streams.

East Swin, which in its general direction extends W. by S. ½ S. and E. by N. ½ N., for 16 miles, narrows from a width of more than 3 miles at the lower end to one mile at its upper end, and is formed between Gunfleet sand and Whitaker spit to the northward, and Sunk and Middle sands to the southward.

GUNFLEET SAND, beginning with the Naze tower bearing N.W., distant 5½ miles, extends W.S.W. and then W. by S. ½ S. 11½ miles to the Spitway, and is about 1½ mile across at its broadest part. The main body

of the sand dries at low-water 2 to 4 feet. The following objects mark its north-eastern end and its south side.

GUNFLEET LIGHTHOUSE* is near the south-east elbow of the Gunfleet, where the direction of that side of the sand changes from S.W. by W. $\frac{3}{4}$ W. to W. $\frac{3}{4}$ S. It is built upon screwed piles, and shows a *red* light *revolving every half-minute,* at 41 feet above the water, and which may be seen in clear weather from a distance of 10 miles. A berth of half a mile should be given it.

Fog Signal.—A bell is sounded during thick or foggy weather *once every ten seconds.*

BUOYS.—N.E. Gunfleet, a conical buoy of large size, *striped horizontally black* and *white,* with staff and diamond, lies near the north-east end of the Gunfleet, in 28 feet, and also marks the south side of Goldmer gat (as described on page 222); from it, Walton hall appears open half its breadth to the northward of the Naze tower, bearing N.W.; and the west end of the lightkeepers' cottages at Dovercourt, in line with Dovercourt low lighthouse, N.N.W.; West rocks buoy, N.E. $\frac{1}{4}$ E., distant $2\frac{1}{4}$ miles; Stone banks buoy, N.N.W. $\frac{3}{4}$ W., 5 miles; Sunk light-vessel, E. by S. $\frac{1}{4}$ S., $3\frac{1}{10}$ miles; Sunk head buoy, S. by E., 4 miles; Middle Gunfleet buoy, S.W. $\frac{3}{4}$ W., $2\frac{3}{10}$ miles; and Gunfleet lighthouse, S.W. by W. $\frac{1}{2}$ W., $4\frac{6}{10}$ miles.

Middle Gunfleet, a *black* cylinder, lies in 5 fathoms, with the north end of Walton barn, touching the Naze tower, bearing N.N.W.; and a large white house next east of Great Holland church, just open to the westward of the old battery at the west end of Frinton cliff, N.W. $\frac{3}{4}$ W.; N.E. Gunfleet buoy, N.E. $\frac{3}{4}$ E., distant $2\frac{3}{10}$ miles; Gunfleet lighthouse, W. by S. $\frac{3}{4}$ S., $2\frac{1}{3}$ miles; and Gunfleet spit buoy, S.W. by W. $\frac{3}{4}$ W., $2\frac{6}{10}$ miles.

Gunfleet spit, a *black* cylinder, lies in 5 fathoms, with the eastern trees at Felixstowe, open to the northward of Gunfleet lighthouse, bearing N.N.E. $\frac{3}{4}$ E.; and Great Clacton windmill, opening to the westward of a compact clump of trees, N.W. $\frac{3}{4}$ W.; Middle Gunfleet buoy, N.E. by E. $\frac{3}{4}$ E., distant $2\frac{6}{10}$ miles; Sunk light-vessel, E. by N. $\frac{1}{4}$ N., $7\frac{4}{10}$ miles; and S.W. Gunfleet buoy, W. $\frac{3}{4}$ S., $2\frac{2}{10}$ miles.

S.W. Gunfleet, a *black* cylinder, lies in 4 fathoms, with Great Holland church, in line with the southernmost of two wrecks on the sand, bearing N. $\frac{3}{4}$ W.; and the tower of St. Osyth priory, open a little to the westward of the coastguard houses between towers Nos. 5 and 6, N.W. $\frac{1}{2}$ W.;

* *See* view on Admiralty chart of the river Thames, sheet 1, No. 1,975.

Gunfleet spit buoy, E. ¾ N., distant $2\frac{3}{10}$ miles; and West Gunfleet buoy, W. by S., 2½ miles.

West Gunfleet, a *black* cylinder, lies in 4 fathoms, with the tower of Great Holland church, half its breadth open to the northward of three trees in the foreground, bearing N. by E. ¼ E.; and a black building eastward of a high house, in line with the north side of No. 2 Mortella tower, N.W. ¼ N.; S.W. Gunfleet buoy, E. by N., distant 2½ miles; Swin spitway buoy, W. ¾ S., 3 miles; Swin Middle light-vessel, S.W. by W. ¼ W., $6\frac{6}{10}$ miles.

WHITAKER SPIT, the north-eastern extremity of Foulness sand, is about 2 miles to the south-west of the Spitway, and is separated from the Buxey by Whitaker swashway, or channel, leading towards the river Crouch.

Buoy.—Its eastern end is marked by a conical buoy, *striped black* and *white horizontally*, and surmounted by a staff and diamond, in 21 feet, bearing S.W. by S., $1\frac{3}{10}$ mile from Swin spitway buoy, and N.E. ½ E. from Swin Middle light-vessel; with the large fan tree at the Naze, in line with the south-west land, bearing N.E. northerly; and Southminster east windmill, open to the northward of Tillingham coastguard house, W. by N. ¼ N.; Swin spitway buoy, N.E. by N., distant $1\frac{4}{10}$ mile; Gunfleet lighthouse, E. by N. ⅔ N., 9 miles; Heaps buoy, E. ¾ S., 4¼ miles; and Swin Middle light-vessel, S.W. ½ W., $2\frac{6}{10}$ miles.

Whitaker Beacon (placed in 1839) is W. by S. ¾ S. 1¾ mile from Whitaker buoy, and N. by E. ¾ E. $1\frac{1}{10}$ mile from Swin Middle light-vessel; it is 40 feet high, *black*, and fitted as a life-beacon. From it, Great Clacton church and mill appear in line with Mortella tower No. 6, bearing N.N.E. ¾ E.; and Bridgewick farm, midway between Southminster church and the west mill, W. by N. ⅔ N.



Whitaker beacon.

Whitaker beacon is the divisional mark between East and West Swins.

SUNK, the north-easternmost of the dangers on the opposite or south-east side of East Swin, is an extensive shoal lying in a direction nearly parallel to Long sand, from which it is separated by Black deep, a channel 2 miles across. The Sunk is 15 miles long, 1½ mile broad, steep-to on both sides, and broken up into patches, which dry in several places at low-water, that on the Great Sunk to 4½ feet.

The north-east extremity of the Sunk is S. by E. ¼ miles from Gunfleet N.E. buoy, and W. ½ N., 5 miles from Long sand buoy.

BUOYS.—Sunk Head, a *chequered black* and *white* conical buoy, lies in $5\frac{1}{2}$ fathoms, 2 miles below the dry part of the Great Sunk; with the Naze tower, in line with the middle of a long barn, bearing N.N.W. $\frac{3}{4}$ W.; and the town of Harwich, open to the westward of N.E. Gunfleet buoy, N. by W. $\frac{1}{4}$ W.; N.E. Gunfleet buoy, N. by W., distant 4 miles; Sunk light-vessel, N.E. $\frac{3}{4}$ N., $3\frac{9}{10}$ miles; S.W. Shipwash buoy, N.E. $\frac{1}{4}$ N., $8\frac{1}{4}$ miles; and Long-sand-head buoy, E. $\frac{1}{2}$ S., 5 miles.

West Sunk, a cylinder, *striped vertically black* and *white*, lies in 10 fathoms, about 6 cables from the western part of the Great Sunk; with Gunfleet light-house, in line with the inner end of Walton pier, bearing N. by W.; Gunfleet lighthouse distant $3\frac{1}{2}$ miles; Heaps buoy, West, $4\frac{9}{10}$ miles; and Sunk-head buoy, E. by N. $\frac{3}{4}$ N., $4\frac{1}{2}$ miles.

SUNK LIGHT-VESSEL is moored in $9\frac{1}{2}$ fathoms, 4 miles to the north-eastward of the north-east extremity of Sunk sand, to mark the entrance to East Swin, as well as to serve as a guide to vessels rounding Long sand head. The light is a *revolving* light, showing flashes *every forty-five seconds*, alternately *red* and *white*, of nearly equal power; it is 33 feet above the water, and visible at the distance of 10 miles in clear weather.

Fog Signal.—A gong is sounded during thick or foggy weather.

By day, the vessel carries a half ball over the usual ball at the mast-head.* From her, Ramsholt barn appears midway between Ramsholt church and the easternmost Mortella tower at Woodbridge haven, bearing N. $\frac{2}{3}$ W.; and a windmill at the back of Felixstowe, in line with the middle of the terrace at Felixstowe, N. by W. $\frac{1}{4}$ W.; West rocks buoy, N.N.W. $\frac{3}{4}$ W., distant $2\frac{6}{10}$ miles; Rough buoy, N. $\frac{1}{2}$ E., $4\frac{9}{10}$ miles; S.W. Shipwash buoy, N.E. $\frac{1}{3}$ E., $4\frac{4}{10}$ miles; Inner Gabbard buoy, E. $\frac{1}{2}$ N., $15\frac{1}{2}$ miles; Galloper light-vessel, S.E. $\frac{7}{8}$ E., 16 miles; Long-sand-head buoy, S.E. $\frac{3}{4}$ S., $4\frac{3}{4}$ miles; and Sunk-head buoy, S.W. $\frac{3}{4}$ S., $3\frac{9}{10}$ miles.

MIDDLE.—Two sands, the Barrow and the Middle, occupy the space between the south-west end of the Sunk and Whitaker spit.† Of the three channels thus formed, Barrow and Middle deeps are unbuoyed, and are therefore not used; the remaining channel, constituting the upper end of East Swin, is between Whitaker spit to the north-westward, and the Middle to the south-eastward. The lower or eastern end of the Middle, 5 fathoms, is S.W. by W. $\frac{3}{4}$ W., nearly 12 miles from Sunk light-vessel, and S.W. $5\frac{1}{10}$ miles from Gunfleet lighthouse; thence, bending to the westward, it extends W. $\frac{3}{4}$ S. for 7 miles to its opposite extremity in a depth of 3 fathoms; it is only one-quarter of a mile broad, is steep-to on both sides, and has but little water over it, there being several patches of 5 feet.

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* *See* Regulations respecting light-vessels, foot-note, page 101.

† The Knock John, to the south-westward of the Sunk, and Barrow ridge, being out of the proper navigation, further reference to them is unnecessary.

BUOYS.—The Middle is thus marked :—

Heaps, a conical buoy of the largest size, *striped vertically black* and *white*, with staff and cage, lies in 6 fathoms, one mile from a depth of 18 feet at its eastern end; at it, the tower of Great Holland church appears twice its length open to the eastward of West battery house on Frinton cliff, bearing N. $\frac{3}{4}$ E.; and Brightlingsea church, in line with a high clump of trees next east of a white house on the hill westward of St. Osyth, N.N.W. $\frac{3}{4}$ W.; Gunfleet lighthouse, N.E. $\frac{1}{2}$ E., distant $5\frac{1}{2}$ miles; Sunk light-vessel, E.N.E., $12\frac{1}{2}$ miles; Sunk-head buoy, E. by N., $9\frac{9}{10}$ miles; Swin spitway buoy, N.W. by W. $\frac{1}{2}$ W., $3\frac{6}{10}$ miles; and N.E. Middle buoy, West, southerly, $2\frac{4}{10}$ miles.

N.E. Middle, a can, *striped vertically black* and *white*, lies in $4\frac{1}{2}$ fathoms, with a white mill on the backland, just open eastward of No. 6 Mortella tower, bearing N. $\frac{1}{4}$ E.; and the cupola of St. Osyth priory, open to the westward of St. Osyth church tower, N. by W. $\frac{1}{4}$ W.; Heaps buoy, East, northerly, distant $2\frac{8}{10}$ miles; and North Hook buoy, W. $\frac{3}{4}$ S., $1\frac{2}{10}$ mile.

North Hook Middle, a can, *chequered black* and *white*, lies in 27 feet, with a clump of trees to the northward of Great Clacton church, in line with No. 5 Mortella tower, bearing N. $\frac{3}{4}$ E.; and a single tree at St. Osyth, midway between No. 3 Mortella tower and the coastguard house near it, N. $\frac{1}{2}$ W.; N.E. Middle buoy, E. $\frac{3}{4}$ N., distant $1\frac{2}{10}$ mile; and Swin Middle light-vessel, W. by S. $\frac{1}{2}$ S., $2\frac{8}{10}$ miles.

West Hook Middle, a can, *striped vertically black* and *white*, lies in 7 fathoms, about midway between S.W. Middle and North Hook Middle buoys; with Whitaker and Buxey beacons in line, bearing N.W. westerly; Whitaker buoy, N.E. by N., distant $1\frac{6}{10}$ mile; and Swin Middle light-vessel, W. by S. $\frac{1}{2}$ S., $1\frac{3}{10}$ mile.

S.W. Middle, a conical buoy, *striped vertically black* and *white*, with staff and cage, lies in 19 feet; with Swin Middle light-vessel bearing N. by E., distant $5\frac{1}{2}$ cables; N.E. Barrow buoy, S. $\frac{1}{2}$ E., $1\frac{1}{2}$ mile; and N.E. Maplin buoy, S.W. $\frac{1}{2}$ W., $1\frac{4}{10}$ mile.

SWIN MIDDLE LIGHT-VESSEL is moored in $5\frac{1}{2}$ fathoms, $\frac{4}{10}$ of a mile to the northward of the western extremity of Middle sand, and W. by S. $\frac{1}{2}$ S. $2\frac{8}{10}$ miles from the North Hook buoy. The light is *white*, shows a *flash every half-minute*, at a height of 36 feet above the water, and may be seen in clear weather 10 miles distant.

Fog Signal.—A gong is sounded during thick or foggy weather.*

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* *See* Regulations respecting light-vessels, foot-note, page 101.

From the vessel, Whitaker beacon bears N. by E. $\frac{3}{4}$ E., distant $1\frac{1}{10}$ mile; North Hook buoy, E. by N. $\frac{1}{2}$ N., $2\frac{8}{10}$ miles; N.E. Maplin buoy, S.W. $\frac{1}{2}$ S., 2 miles; Sunk light-vessel, E. by N. $\frac{3}{4}$ N., $18\frac{1}{2}$ miles; Maplin lighthouse, S.W. $\frac{1}{2}$ S., 4 miles; and S.W. Middle buoy, S. by W., $5\frac{1}{2}$ cables.

Directions for East Swin.—It has been remarked (on page 230) that, owing to the nature of East Swin and its distance from the low shore abreast, great attention should be given to the courses and distances sailed, and to the sets of the tides.

Approaching East Swin at night, the Sunk light should not be brought to the southward of S. by W. to clear the West rocks and Rough, nor to the northward of N.W. to clear Long sand head.

Being abreast of, and one mile to the north-westward of, Sunk light-vessel, steer S.W. by W. $\frac{1}{3}$ W. for 7 miles, when Gunfleet lighthouse will bear N. by W., distant $1\frac{1}{3}$ mile; then steer W. by S. $\frac{1}{4}$ S. for $8\frac{3}{4}$ miles, when Swin Middle light-vessel will bear S.W. by W. $\frac{1}{2}$ W., westerly, $2\frac{1}{2}$ miles, on which bearing she may be closed. At night, pass close to Sunk light, and keep it bearing E.N.E., until Gunfleet light has been brought to bear N. by W., then proceed as before. Gunfleet light will indicate the position of that sand.

In working, stand into 8 fathoms from the north-east end of the Gunfleet to Gunfleet lighthouse, and towards Sunk sand, until Sunk light-vessel bears N.E. by E. When well above Gunfleet lighthouse, tack before it bears E.N.E. Above the Heaps buoy, East Swin being greatly diminished in width, do not bring the Middle light-vessel to the westward of W. by S. $\frac{3}{4}$ S., nor to the southward of S.W. $\frac{1}{3}$ W., until well up to her; the last-mentioned bearing just clears Whitaker spit, and leads to eastward of Swin spitway buoy.

At Swin Middle light-vessel the channel is less than one mile wide.

CAUTION.—Owing to the nature of the navigation in East Swin, and to a want of due caution, more wrecks have occurred in it than upon any other portion of the eastern coast.

Before the placing of Gunfleet light-vessel, which has been superseded by the pile lighthouse, the wrecks generally took place upon Gunfleet sand, about 3 miles to the westward of the lighthouse.

The establishment of Gunfleet lighthouse has, no doubt, prevented such frequent losses, but the principal causes of accidents are, gross neglect of the lead; not making sufficient allowance for the tide-set when running in strong south-easterly winds at the latter part of the flood, at which time the vessel is being set to leeward by both tide and sea; from vessels at the same period of tide keeping too close to the Gunfleet in scant north-westerly winds; and, lastly, from their standing in too close to the sand when working, and grounding when in stays.

TIDES.—At the north-east end of the Gunfleet, it is high-water, full and change, at 11h. 40m.; springs rise 12 feet, neaps 8 feet, and neaps range 4 feet, and the rates of their streams are 2¾ knots and one knot per hour, respectively.

Between the Shipwash and West rocks the stream at half-flood sets S.W. by W. ½ W., and at half-ebb N.E. ½ E.

Between the Shipwash and Long sand, the first-quarter ebb sets N.E. ½ E.; and from 2 to 4½ hours' ebb, the set is E. by N.

About one mile to the eastward of Gunfleet N.E. buoy, the first of the flood sets South; from one to 4½ hours' flood the set is W.S.W., and last-quarter flood N.W. The first of the ebb is North, one hour to 4½ hours' ebb, N.E. ½ E., and last-quarter ebb, E.S.E. Over all the lower portion of the Swin, the last of the flood-stream has a general tendency to the north-west.

During springs, the stream between the north-east end of the Gunfleet and the Sunk turns at 12 o'clock; between the north-east end of the Gunfleet and the Naze at 0h. 10m., and at the upper end of East Swin at 0h. 20m.

The flood sets strongly across Long sand head into Black deep and East Swin, and also in like manner across the north-east end of the Gunfleet into the Wallet, the last of the flood in both cases veering north-westward right across them. There is a strong indraught during the flood into Whitaker swashway, and both flood and ebb set obliquely across all the shoals.

RIVER CROUCH, from its source in the south part of Essex to its outlet at Foulness, is 26 miles long, its course for the last 5 miles being between low embanked lands. Below Foulness island the channel is uneven and encumbered with a Middle ground, but for some miles within Foulness the bed is uniform from side to side. A shoal called the Bar, situated nearly in the middle of the river, with 2 feet over it, and midway between Pagglesham creek and Burnham, is the greatest obstruction. The northern passage, which is the widest and deepest, has 3 fathoms in it at low-water.

BURNHAM, known for its important oyster fishery, is upon the left bank of the Crouch, 5 miles above its outlet; it has also a small coal and corn trade.

The general shipping-place, however, is at Hull bridge, a sort of causeway, dry at low-water, 12 miles above Burnham, where is also a quay. Colliers lie in the stream and deliver their coals into lighters for Battle bridge (the first fixed one), 3 miles higher up. During springs, vessels drawing 10 and 11 feet reach Hull bridge, and those of 8 feet draught get up to Battle bridge. Corn is exported, and corn and oilcake are received.

Population, 2,032 in 1871.

BUXEY SAND, in the approach to the Crouch, being only separated by the shallow swashway, the Spitway, from the Gunfleet, may be considered as a continuation of that sand; it is bounded to the southward and north-westward by Whitaker and Raysand channels. Six feet upon its east end is $\frac{1}{3}$ mile to the northward of Swin spitway buoy, its south side (which is irregular) then holds W. $\frac{1}{2}$ S. for 6 miles to the entrance of the Crouch; its north side is convexed, and the sand at its widest part is $1\frac{1}{2}$ mile across; the greater portion of it dries from 4 to 5 feet at low-water.

BEACONS and BUOYS.—The following beacon and buoys mark the Buxey:—

Buxey Beacon is upon the north-west dry part of the sand, S.W. by W. $\frac{1}{3}$ W., $1\frac{1}{3}$ mile from Buxey North buoy; it is an iron cylinder, 36 feet high, surmounted by a ribbed horizontal cross.

South Buxey, a *red* can, in 15 feet, near the outer end of a projection of the sand, named Swallow tail, is W. by S. $\frac{1}{2}$ S., $2\frac{9}{10}$ miles from Swin spitway buoy, and W. $\frac{2}{3}$ N. 2 miles from Whitaker spit buoy; Ridge buoy bears W. by S. $1\frac{9}{10}$ mile; and West Buxey buoy, W. $\frac{1}{4}$ S., $3\frac{2}{10}$ miles.

West Buxey, a *red* can, is in 7 feet, upon the west end of the sand, and W. $\frac{1}{4}$ S., $3\frac{2}{10}$ miles from Buxey south buoy; with West Mersea church, open to the northward of St. Peter's chapel, bearing N. by W.; and a conspicuous tree on Foulness island, in line with East Newlands farm-house, S.W. by W. $\frac{3}{4}$ W.

North Buxey, a *chequered red* and *white* can, lies in 24 feet, near the north rounded portion of the sand, W. $\frac{1}{2}$ N. $3\frac{1}{2}$ miles from Wallet spitway buoy; with Brightlingsea church, appearing midway between the end of the wood and No. 1 Mortella tower, N. $\frac{3}{4}$ E.; and Buxey beacon, S.W. by W. $\frac{1}{3}$ W., distant $1\frac{1}{3}$ mile.

Raysand Beacon, standing in a depth of one foot at low-water upon the eastern spit of Raysand, is a slender beacon with an inverted triangle; from it, West Mersea church is open its own length to the westward of St. Peter's chapel, bearing N. $\frac{1}{2}$ W.

Directions for Entrance to the Crouch.—Whitaker Channel, the southern entrance into the river Crouch, having the Buxey to the northward, and Whitaker spit and Foulness sand to the southward, is marked by Whitaker spit buoy; the Ridge, a *chequered red* and *white* can buoy, lying in 12 feet on the Foulness side opposite to the inner end of the Buxey, and by South Buxey *red* buoy to the northward.

The course through Whitaker channel is at first W. $\frac{1}{4}$ S., with South Buxey buoy on the starboard hand, and the Ridge buoy to port, and having passed the latter, keep more southerly and close to Foulness sand to avoid

the Sunken Buxey with 5 feet upon it, which narrows the channel to a cable across, and when clear of the latter shoal, the Crouch has been entered.

Raysand Channel connects the head of the Wallet and Swire Hole with the Crouch, and is formed by the Buxey to the south-eastward, and Dengie flat and Raysand to the westward; it is very narrow, with 12 to 15 feet in it at low-water, and is steep-to on the Buxey side.

Swire Hole, the head of the deep water in the Wallet, is between Bachelor spit and the shoals about the entrance of the Colne to the northward, and the Buxey to the southward. Many vessels anchor in it in the winter season during southerly and south-westerly gales, in preference to riding in the Swin. The best berth is one mile to the eastward of Buxey North buoy, where the holding-ground is good, and the depths 6 and 7 fathoms.

From abreast the Spitway, Bridgewick barn, just clear of the north-east end of the coast-guard houses, bearing W. ¼ S. southerly, will lead through Swire Hole and clear the Buxey to the northward, until St. Osyth priory is brought in line with the white house, N.E. ¾ N.; this latter mark leads through Raysand channel to abreast Buxey West buoy; then a conspicuous tree on Foulness island, in line with East Newlands farmhouse, bearing S.W. by W. ½ W., will lead into the entrance of the Crouch to within one mile of Foulness, when a pilot should be obtained.

TIDES.—It is high-water, full and change, at Foulness, at 0h. 5m., and at Hull bridge, at 0h. 25m. Springs rise 14½ feet at Foulness, and 16 feet at Hull bridge. Neaps rise 10½ feet and 11 feet.

WEST SWIN.

West Swin, extending from East Swin to the Nore, and bounded by Foulness and Maplin sands to the north-westward, and Barrow, Mouse, and Oaze, sands to the south-eastward, is a channel 16 miles long, with an average width of one mile.

SOUTH-WEST REACH.—That part of West Swin extending from Swin Middle light-vessel to Maplin lighthouse is named the South-west reach, and is much used as an anchorage on account of the excellent shelter it affords. In westerly winds, vessels waiting the turning of the tide usually anchor in it under the Maplin, but in easterly winds the best berth is with Swin Middle light-vessel bearing North, one mile distant, in 6 to 7 fathoms; higher up the water is deeper.

FOULNESS and MAPLIN SANDS, an extensive flat projecting from the Essex shore for the whole distance from Foulness to

Shoeburyness, is from one to 5 miles in breadth; it dries throughout, shelves regularly from the main, and is broken and rendered irregular in several places by swashways, or fleets. From Whitaker spit, already mentioned as the north-east extremity of the flat, its outer margin extends generally S.W. ½ S., for 5½ miles; W. by S. ½ S., 7 miles; and W. ¾ N., 5 miles, to abreast Shoeburyness.*

MEASURED MILE.—Four beacons, the inner two with circular heads, and the outer two with diamond heads, have been erected within the southern margin of the Maplin between Blacktail spit and East Shoebury buoys, to mark a distance of 6,085 feet, or one geographical mile, on the bearings E. ½ N. and W. ½ S., for the use of Her Majesty's steam-vessels testing their speed. The beacons at the eastern end are, respectively, W. by N. ¼ N. and W. by N. ¾ N., about 2½ miles from Mouse light-vessel; and those at the western end are E. by N. ¾ N. and E.N.E., about 4¼ miles from the Nore light-vessel.

Buoys.—Also, in connection with the above beacons, two spiral buoys, painted *red*, with the word Admiralty in white letters, and each surmounted by a staff and triangle, have been placed near the sand, two-thirds of a mile apart, and parallel to the direction of the beacons, or E. ½ N. and W. ½ S. from each other. The western buoy is moored 1½ cables to the westward of the western beacons in line, and with East Shoebury buoy bearing W. ½ S., distant $\frac{4}{10}$ mile; the eastern buoy lies about midway between the western buoy and Blacktail spit buoy. They are intended to mark out and to determine the track of vessels while testing their speed.

The following objects, marking the edge of the Maplin, occur in the order of their description:—

BUOYS.—N.E. Maplin, a *black* conical buoy, lies in 3¼ fathoms, at the north-east part of the sand; with Canewdon church, in line with the east end of the easternmost trees in Foulness island, bearing W. by N. ¾ N.; and Clacton church, just open to the westward of Whitaker beacon, N.N.E. ¾ E.; Whitaker beacon, N.N.E. ¾ E., distant $3\frac{1}{10}$ miles; Swin Middle light-vessel, N.E. ½ N., 2 miles; and East Maplin buoy, S.S.W. ¾ W., $1\frac{4}{10}$ mile.

East Maplin, a *black* cylinder, in 5½ fathoms, with Mouse light-vessel, just open to the southward of Maplin lighthouse, bearing S.W. by W. ¼ W.; N.E. Maplin buoy, N.N.E. ¾ E., distant $1\frac{4}{10}$ mile; Maplin spit buoy, S.W. ⅓ S., $\frac{6}{10}$ mile; and Maplin lighthouse, S.W. by W. ¼ W., $\frac{7}{10}$ mile.

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* *See* Admiralty chart of river Thames, sheet 2, North Foreland to the Nore, No. 1607; scale, mile = 1·4 inch.

MAPLIN LIGHTHOUSE, [illegible]

Fog Signal.—A bell is sounded [illegible]

From the lighthouse, Mouse light-vessel bears [illegible]

CAUTION.—In passing the lighthouse, vessels should give it a wide berth as the sand has extended in a southerly direction.

BUOYS.—**Maplin spit,** *black* conical buoy, with staff and globe, in 6¼ fathoms, with St. Nicholas church, in height in the westward of Two mast beacon, S. ¾ E. A *white* light from a window 12 feet below the lantern of Maplin lighthouse, bearing S.E. by W. ¾ W.; E. Maplin buoy, S.E. ¾ S., distant ⅞ mile.

West Maplin spit, *black* cylinder, in 3 fathoms, on the western projection of the spit which extends in a southerly direction from Maplin lighthouse; with Maplin lighthouse bearing N.E. ¾ N., distant ⅞ mile; *Maplin spit buoy*, S.E. by E. ¾ E., ¾ mile; Maplin buoy, W. ¾ S., 1⅞ mile.

Maplin, *black cylinder*, in 3½ fathoms; with the tower of Canewdon church, open to the northward of a house with three low chimneys, bearing *N.W. ¼ N.*; and Prittlewell church, in line with a tower-like tree to the right of Great Wakering church, W. by N. ¾ N.; West Maplin spit buoy, E. ¾ N., 1⅞ mile; S.E. Maplin, W. by S. ¾ S., 2 miles; Mouse light-vessel, N.W. ¾ N., 1⅞ mile.

S.E. Maplin, *black* cylinder, in 4 fathoms; with Canewdon church, in line with the middle of a long barn on Foulness island, bearing N.W.; and Burnham mill, midway between Foulness mill and a barn and tree next west of it, N.N.W. ¼ W.; Maplin buoy, E. by N. ¾ N., distant 2 miles; West Barrow buoy, E. ¼ S., 2⅞ miles; Mouse light-vessel, S.E. ¼ S., one mile; and Blacktail spit buoy, W. by S. ¾ S., 1½ mile.

Blacktail spit, a *black* conical buoy, with staff and globe, in 7 fathoms; with the west end of a remarkable clump of trees, in line with

the coast-guard vessel in Havengore creek, bearing N.W. ½ N.; and Barling church, in line with the south-east beacon of the measured mile, N.W. S.E. Maplin buoy, E. by N. ¾ N., distant 1½ mile; Mouse light-vessel, E. ½ S., $2\frac{1}{10}$ miles; and East Shoebury buoy, W. ⅓ S., $1\frac{9}{10}$ mile.

Then occur the Admiralty buoys already noted.

East Shoebury, *black* cylinder, in 6 fathoms; with Canewdon church, in line with a small black building to the westward of a large farm, bearing N.N.W. ¼ W.; and Hamlet mill, in line with a large house next west of Shoebury coast-guard station, N.W. by W. ½ W.; Blacktail spit buoy, E. ⅓ N., distant $1\frac{9}{10}$ mile; Mouse light-vessel, E. ¼ S., 4 miles; and South Shoebury buoy, W. ¼ N., $1\frac{6}{10}$ mile.

South Shoebury, *black* cylinder, in 5¼ fathoms; with Prittlewell church, just open west of a large black building, bearing N.W.; and Southchurch, in line with the west end of a large house next west of Shoebury coast-guard station, N.W.; East Shoebury buoy, E. ¼ S., distant $1\frac{6}{10}$ mile; and Middle Shoebury buoy, W. by N., $1\frac{6}{10}$ mile.

Middle Shoebury, *black* cylinder, in 4½ fathoms; with Prittlewell church, in line with the west end of a large red-tiled building at Southchurch, bearing N.W. by N.; and Queenborough church, just open to the southward of a chapel at the west end of Mile-town, S.W. ¼ S.; South Shoebury buoy, E. by S., distant $1\frac{6}{10}$ mile; and Shoeburyness buoy, N.W. by W. ¾ W., $1\frac{8}{10}$ mile.

Shoeburyness, or **West Shoebury,** a *black* cylinder, in 4 fathoms; with Hadleigh castle, twice its breadth to the westward of Southend pier-head, bearing N.W. ½ W.; and Hamlet mill, in line with the west end of New terrace, N.N.W. ¾ W.; Middle Shoebury buoy, S.E. by E. ¾ E., distant $1\frac{8}{10}$ mile; Nore light-vessel, S.E. by S., $2\frac{6}{10}$ miles; and East River Middle buoy, W. ¾ N., $1\frac{2}{10}$ mile.

This completes the description of the objects on the north-west side of West Swin.

BARROW SAND.—Barrow sand (alluded to on page 233) beginning between Middle and Sunk sands, is divided into several portions, termed East Barrow, Barrow, and West Barrow; the latter two, abreast Maplin lighthouse, reduce the width of West Swin to three-quarters of a mile. The Barrow, collectively, is 15½ miles long, and 2 miles to one mile wide, and extensive portions of it dry from 3½ to 6½ feet at low-water.

MOUSE SAND, originally detached, is now joined to, and forms the western extremity of, West Barrow; a great part of the sand dries, and it is very steep on the northern or Swin side. These sands are marked as follows :—

BUOYS.—N.E. Barrow, can, *chequered black* and *white*, lies in 4 fathoms; with Canewdon church, open to the northward of the trees on Foulness Island, bearing W. by N. ¾ N.; Swin Middle light-vessel, North, $2\frac{1}{16}$ miles; N.E. Maplin buoy, W. by N. ¾ N., $1\frac{3}{16}$ mile; Maplin lighthouse, W.S.W., $2\frac{1}{16}$ miles; and East Barrow buoy, S.W. ¼ S., 2 miles.

East Barrow, conical, *striped vertically black* and *white*, lies in 6 fathoms, E. by S. ¾ S., 1¼ mile from Maplin lighthouse; with Canewdon church, in line with a small dark-coloured building next north of Foulness church, bearing N.W. by W. ½ W.; and Burling church and Maplin lighthouse in line, W. by N. ¼ N.; N.E. Maplin buoy, N. ¼ E., distant $1\frac{5}{16}$ mile; and Middle Barrow buoy, W.S.W., $1\frac{6}{16}$ mile.

Middle Barrow, conical, *chequered black* and *white*, lies in 7 fathoms, with West Barrow buoy, bearing W. by S. ¾ S., distant $1\frac{5}{16}$ mile; East Barrow buoy, E.N.E., $1\frac{6}{16}$ mile; and Maplin *lighthouse*, N. by E. ¾ E., one mile.

West Barrow, conical, *striped vertically black* and *white*, lies in 7¼ fathoms, near the West Barrow; and S.W. ½ W., nearly $2\frac{4}{16}$ miles from Maplin lighthouse; with Shivering sand buoy and Girdler light-vessel in line, bearing S. by E. ¾ E.; Middle Barrow buoy, E. by N. ¾ N., distant $1\frac{7}{16}$ mile; Maplin buoy, N. by W. ½ W., one mile; and Mouse light-vessel, S.W. by W. ¾ W., $1\frac{6}{16}$ mile.

MOUSE LIGHT-VESSEL is moored in 4 fathoms, at the distance of one-quarter mile from the depth of 12 feet upon the western end of the Mouse, and exhibits a *revolving green* light, showing a flash *every twenty seconds*, at 35 feet above the water, and visible at the distance of 10 miles in clear weather.

Fog Signal.—A gong is sounded during thick or foggy weather.*

The vessel lies with Burnham mill, open to the westward of Foulness mill, bearing N.N.W. ½ W.; and the north-western mile-beacon, open to the northward of the south-eastern mile-beacon, W. by N. ⅛ N.; Maplin lighthouse, N.E. by E. ¼ E., distant 4 miles; Blacktail spit buoy, W. ½ N., $2\frac{1}{16}$ miles; Nore light-vessel, W. ⅜ S., 7⅛ miles; and East Oaze buoy, S.E. ¾ S., $1\frac{7}{16}$ mile.

Above Mouse light-vessel, West Swin increases considerably in width, extending from the Maplin over to the Oaze, (which will be found described on page 268,) and southern flat. The following objects show the southern boundary of the remaining portion of West Swin:—

North Oaze, a can buoy, *striped vertically black* and *white*, lies in 5¾ fathoms, on the north side of Oaze sand; with the south-eastern beacon

* *See* Regulations respecting light-vessels, foot note, page 101.

of measured mile, in line with Great Wakering church, bearing N.W. $\frac{2}{3}$ W.; East Oaze buoy, E. by S., distant $1\frac{2}{10}$ mile; West Oaze buoy, W. by S. $\frac{2}{3}$ S., $2\frac{3}{4}$ miles; and Mouse light-vessel, N. $\frac{3}{4}$ E., $1\frac{2}{10}$ mile.

West Oaze, a *black* and *white horizontally striped* conical buoy, with staff and triangle, is in $4\frac{1}{2}$ fathoms, off the western extremity of Oaze sand, S.W. $\frac{3}{4}$ W., $3\frac{1}{2}$ miles from Mouse light-vessel, and three-quarters of a mile from 12 feet depth upon the sand; with Shottenden mill, appearing midway between the two mussel-houses near Shellness, at the south-east point of Sheppey, bearing S.S.W. $\frac{1}{4}$ W.; and Prittlewell church, its length on the west end of a terrace at Shoebury, N.W. $\frac{1}{4}$ W.; Nore light-vessel, W. by N. $\frac{1}{8}$ N., distant $4\frac{2}{3}$ miles.

Cant, a *chequered black* and *white* can, in 4 fathoms, on the north edge of the southern flat, one cable from the depth of 5 feet on East Cant, or Cantedge, shoal, lies W. $\frac{1}{2}$ S., $1\frac{2}{3}$ mile from West Oaze buoy; with Shottenden mill, just open of the bluff at Warden point in Sheppey, bearing S. by W. $\frac{1}{2}$ W.; and the eastern coke chimney at Whitstable, appearing midway between the western coke chimney and Whitstable church, S. by E. $\frac{1}{2}$ E.; Nore light-vessel, W.N.W., distant $3\frac{2}{10}$ miles.

NORE LIGHT-VESSEL, the divisional mark between West Swin and Sea reach, is moored in 23 feet at the east end of Nore sand, and shows a *white* light, which *revolves every half-minute*, at 35 feet above the water, and may be seen in clear weather at the distance of 10 miles.

Fog Signal.—A gong is sounded during thick or foggy weather.*

From the light-vessel, the two easternmost mills at Miletown are in line, bearing S.W. by W.; and Minster church is in line with the east end of a triangular hedge-row, named Mizen hedge, S.S.W.; Southend pier lighthouse is N.W. $\frac{1}{2}$ N., distant $4\frac{1}{4}$ miles; River Middle East buoy, N.W. $\frac{1}{4}$ W., $3\frac{6}{10}$ miles; Blacktail spit buoy, E. by N. $\frac{1}{8}$ N., $5\frac{1}{2}$ miles; and Mouse light-vessel, E. $\frac{5}{8}$ N., $7\frac{4}{10}$ miles.

The first light-vessel established was the one placed at the Nore in 1732, at 41 miles below London bridge. She is a common point of arrival and departure, to vessels proceeding into, or out of, the Thames.

Directions for West Swin.—The following courses lead in mid-channel up West Swin.

From Swin Middle light-vessel, S.S.W. $\frac{3}{4}$ W. for 4 miles, leads about half a mile to the eastward of Maplin lighthouse, then W. by S. $\frac{3}{4}$ S., $4\frac{3}{4}$ miles, leads three-quarters of a mile to the westward of Mouse light-vessel, and then W. by S., 7 miles, carries up to the Nore.

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* *See* Regulations respecting light-vessels, foot note, page 101.

In working, when within one mile of Maplin lighthouse do not bring it to the southward of S.W. by W. ½ W., to avoid the flat which has extended out from the Maplin. Stand towards that sand into 6 fathoms, and towards the Barrow into 7 fathoms.

Abreast Maplin lighthouse, or in Shoe Hole, as it is termed, tack on the first shoal cast, as the sands on both sides fall suddenly into deep water. Above Maplin lighthouse, stand towards the Mouse and Oaze into 7 fathoms, and towards the Maplin into 8 and 7 fathoms. When above the Cant, Nore light-vessel must not be brought to the northward of W.N.W., as the sand is very steep.

CAUTION.—In the lower portion of West Swin, the flood stream sets strongly upon the Maplin, and the ebb stream sets across Barrow sand.

TIDES.—It is high-water, full and change, at the Nore, at 0h. 30m.; springs rise 15½ feet, neaps 13 feet, and neaps range 11½ feet.

CHAPTER IX.

NORTH FORELAND TO THE NORE.

VARIATION, 17° 20′ to 17° 40′ West in 1882.

NORTH FORELAND* is a promontory of the nearly perpendicular chalk cliffs which, varying in height from 60 to 120 feet, form the sea front of the south-east and north-eastern sides of the isle of Thanet from Pegwell bay to Cliff-end. It is rendered more conspicuous by a light-tower of octagonal form and coloured white, which stands at about 300 yards within the brink of the cliff. At half a mile to the northward of the lighthouse is Moro castle, a castellated building of flint, close to the cliff on the south point of Kingsgate bay, and at one-quarter of a mile farther to the northward upon Whiteness, the north point of the bay, is Neptune tower, white, with a wide basement.

A Life-Boat is stationed at Kingsgate bay.

LIGHT.—North Foreland has long been an important light station. A wooden structure used as a lighthouse was burnt down in 1683, when the present tower was erected, which exhibited a coal fire from its summit; in 1790, oil lamps were substituted, the tower having been heightened and improved. In 1834, a further improvement was made in the light by the introduction of parabolic reflectors, and it is now of the first order, and *white*, except between the bearings S. by E. $\frac{3}{4}$ E. and S. by W., where it shows *red* to clear the east end of Margate sand, the eastern limit of the red light passing one cable eastward of East Margate buoy. The light, including the red sector, has recently (July, 1880) been made *occulting*; once in *every half-minute* it disappears suddenly and remains obscured for *five seconds*, and then, as suddenly, re-appears at full power; it is 188 feet above high-water, and visible in clear weather from the distance of 19 miles.

FORENESS, N.W. by N., two-thirds of a mile from Whiteness, is the north-east point of the isle of Thanet, and the turning point to Margate road and South channel; its height is about 50 feet.

* *See* Admiralty chart of river Thames, sheet 2, North Foreland to the Nore, No. 1,607; scale, mile=1·4 inch: Also, England, East Coast, North Foreland to Orfordness, including the entrance to the Thames, No. 161); scale, mile = 0·5 inch.

LONGNOSE LEDGE, a dangerous reef of chalk rocks, projects north-east 4 cables from Foreness.

Buoy.—The extremity of the ledge is marked by a conical buoy, *striped vertically black and white*, in 4 fathoms, with Margate old church in line with the northernmost of the two mills at Margate, bearing W. by S.; and North Foreland lighthouse, S. ¼ W.

By day, North Foreland lighthouse kept open to the eastward of Neptune tower, and Birchington north, or sand mill, open of Fort point at Margate, bearing West, clear the east and north sides of this ledge. *At night*, North Foreland light, bearing S. by W. ¼ W., and Margate pier *red* light open, W. by S., will clear them also.

MARGATE.—From Foreness the line of cliff extends in a W. by N. ¼ N. direction for 1¼ mile to Fort point, immediately beyond which is the town of Margate, built chiefly on the declivities of two hills and in the valley between. Its handsome modern church, with a square tower 135 feet high, stands on the cliff at the north-east part of the town near Fort point, and may be seen at a considerable distance. The old church, built of flint, with a square tower surmounted by a small pointed turret, standing on an eminence at the south end of the town, and the pier lighthouse, are also conspicuous objects. Margate is chiefly noticed as a watering-place, but it has some little trade, and a considerable fishery for skate, soles, &c. is carried on. It is connected with London by the London Chatham and Dover Railway, and also by a branch of the South Eastern Railway, which have stations to the westward of the town. Vice-Consuls for most foreign nations are resident. Supplies of all kinds are abundant, and anchors of any size can be obtained. Population 15,889 in 1881.

The Harbour of Margate is formed by a small bay defended by a substantial stone pier on its north-eastern side, 300 yards in length, with an average breadth of 17 yards, and extending in a curved form to the westward. The harbour has an area of 7½ acres, is open to the north-west, and the bottom is sand and mud; it dries at low-water, but there is a depth of 12 feet at the pier-head at high-water springs, and about 10 feet at neaps.

There is a patent slip capable of receiving a vessel of 300 tons.

From the foot of the harbour pier, an iron landing-pier extends northward 1,433 feet to a depth of 9 feet at low-water, and is much used by steam-vessels.

LIGHTS.—A handsome stone tower of the Doric order, 70 feet high, stands at the outer end of the harbour pier; it exhibits all night a *fixed*

red light, elevated 85 feet above high-water, and visible in clear weather at the distance of 10 miles.

There is also a small *green* gas-light on the head of the landing-pier.

Pilots for the river Thames and over sea can be obtained here.

Two Life-Boats belong to the port, and there is also the usual life-saving apparatus.

TIDES.—It is high-water, full and change, at Margate, at 11h. 40m.; springs rise 15½ feet, neaps 13 feet, and neaps range 10½ feet.

MARGATE ROAD is between the shores adjoining Margate and the south side of the eastern portion of Margate sand (*see* page 251). It affords good shelter in southerly and south-west winds, and anchorage may be taken in 8 fathoms about one mile off-shore, between Foreness and Margate, with North Foreland lighthouse bearing S. by E. ¾ E.; or off the town in 7 fathoms, mud, outside the chalky ground.

The COAST from Margate takes a general W. by N. direction to Whitstable. At Westbrook, half a mile to the westward of Margate, is the sea-bathing infirmary, a large brick building with wings; and a terrace of lofty houses. At 2 miles from Margate is Westgate bay, an open space between the cliffs, in which the coast-guard buildings are conspicuous objects. Another break occurs at Apple bay, half a mile farther west, and thence the cliff is unbroken for one mile to Cliff-end, where it terminates. The whole of this coast is subject to a continual waste, which has been estimated at the average rate of 2 feet annually.

Birchington village stands half a mile from the coast, on an eminence to the south-east of Cliff-end, and may be known by its large dark-looking church spire. At one-third of a mile to the northward is a seed mill, and at rather more than 2 miles to the southward, on the highest ground in Thanet, are the two Minster mills.

From Cliff-end to Reculver, 3¼ miles, is the low flat shore of the valley of the river Stour, which, dividing in the lower part of its course, sends one branch to the sea at Sandwich haven, and the other to the estuary of the Thames at North Mouth sluice, one mile to the eastward of Reculver, and forms the western limit of the isle of Thanet.

St. Nicholas church stands upwards of one mile inland, and when on a S.S.W. bearing from the sea, appears midway between Cliff-end and Reculver.

Monkton Beacon, a stone obelisk, is on the highest ground 1¼ mile south-east of St. Nicholas church.

RECULVER church is 3¼ miles to the westward of Cliff-end. Two towers (commonly called the Reculvers) and a portion of the walls are all

that remain of this ancient edifice, which occupies what was the centre of an important military station in the time of the Romans. It is now on the brink of a low earth cliff, and, being a conspicuous sea-mark, is protected from further encroachment of the sea by groynes maintained by the Trinity Board. The town of Reculver is supposed to have been to the northward, on a site now overflown by the sea.

To the westward of Reculver, the coast to Herne bay is composed of high earth cliffs; thence to Whitstable of low undulating cliff of similar character.

HERNE BAY is a modern watering-place, 2¼ miles from Reculver, and whatever it may have been formerly, can no longer be considered a bay, the coast maintaining a nearly straight direction. The town, consisting of fine buildings, greatly resorted to by summer visitors, extends along the shore nearly one mile east and west. Near the centre, and fronting the sea, is a lofty clock-tower, a short distance to the westward of which is a low white windmill, and at the western extremity of the town is a coast-guard station. A pier, constructed on iron piles, projects in a northerly direction from the shore. The village of Herne lies 1½ mile south of Herne bay; it is surrounded by trees, and on the highland to the north-east of the village is Herne mill, black, with a white top.

Stud Hill is the second undulation of the cliff to the westward of Herne bay pier, and has a few small houses upon it.

WHITSTABLE, at the south point of the entrance to the East Swale, which separates the isle of Sheppey from the mainland of Kent, described on page 252, is a town of some note, from the large oyster fishery with which it is connected; its church, white, with a short square tower, stands on rising ground to the eastward. There are also above the town a conspicuous building, and two windmills useful as marks; and to the eastward of the harbour are two tall chimneys.

Harbour.—Whitstable has a small harbour capable of affording shelter to twenty vessels of 150 tons each; it is principally used by colliers.

Signals.—The following signals are shown from a flagstaff at the entrance of the harbour:—

1. A *red* flag is hoisted half-mast when there is 10 feet of water in harbour.

2. A *red* flag half-mast, with ball under, when there is 11 feet of water in harbour.

3. A *red* flag half-mast, with ball over, when there is 12 feet of water in harbour.

4. A *red* flag alone at mast-head, when the depth exceeds 12 feet.

5. When a *black* ball alone is hoisted, vessels to anchor in the bay, and wait for instructions from harbour-master.

The oyster fisheries are the property of a company, and give employment to numerous dredgers. A considerable number of the inhabitants are also employed in the coasting and coal trade. The imports are chiefly coal for the supply of this part of Kent, conveyance of which to the interior is facilitated by the railway to Canterbury. Population, 5,481 in 1871.

To the westward of Whitstable is low marsh land, through which runs Faversham creek, having its outlet into the Swale at nearly 5 miles from Whitstable.

The COAST of SHEPPEY.—Shellness, the south-east point of the isle of Sheppey, and north point of the entrance to the East Swale, is nearly 3 miles north-west of Whitstable, and may be recognized by its low yellow beach with a square beacon and coast-guard buildings upon it.

From Shellness the shore continues low for 3 miles to the northward, when it rises suddenly at Warden point, a steep clay cliff 80 feet high, having upon its summit Warden village church, with a small white tower. Leysdown village and church are conspicuous on the rising land, rather more than one mile to the southward of Warden, and half a mile within the low shore just noticed. Clay cliffs, from 20 to 80 feet in height, form the coast between Warden point and Minster, beyond which they decline, and at half a mile terminate in low land, protected by groynes and a sea-wall, extending for about $2\frac{1}{4}$ miles to Garrison Point, Sheerness, the north-west extremity of the island.

Minster village, $3\frac{1}{2}$ miles to the westward of Warden point, and nearly half a mile from the coast, stands upon the highest part of Sheppey, and its church, with a short square tower surmounted by a white turret, is the most prominent object on the island, being visible from all directions seaward. This church is said to have been in the middle of the island in 1780, so rapid is the waste of the north land of Sheppey. Minster mill, nearly half a mile to the south-eastward of the village, is also very conspicuous.

A coast-guard station is on the shore between Minster cliffs and Cheney rock house, adjoining Bankstown, a suburb of Sheerness: the house is a brick building, and the residence of the foreman of the oyster grounds on this part of the coast.

At Sheerness, the dock-yard chapel with a square tower and flag-staff, Miletown church and mills, and the masting sheers rising above all, are the most conspicuous fixed objects.

SOUTH CHANNEL, INCLUDING THE EAST SWALE, AND FOUR-FATHOMS CHANNEL.

The channel generally known as South channel includes Margate road, and leads about one mile off-shore, through Gore and Horse channels, and thence by the Overland passage between the isle of Sheppey and Spaniard shoals. It is mostly frequented by the smaller class of shipping of not more than 12 feet draught of water. On the southern side of South, Gore, and Horse, channels, are the following dangers:—

NAYLAND LEDGE extends to the north-east nearly half a mile from the cliff near the infirmary on the west side of Margate. Chislet mill (in-shore of Reculver) open of Cliff-end, will clear it in 15 feet at low-water, but a good offing by the lead is the best guide.

Between Margate infirmary and Cliff-end are several projecting ledges of rock, which, from the difficulty in estimating distance from the cliffs, are very dangerous when covered. They should not be approached so near as to shut Foreness in with Fort point. In hazy weather the lead must be depended on to clear them.

RECULVER SAND is a continuation of the flat adjoining the shore to the westward of Cliff-end. The sand extends north-east $1\frac{1}{4}$ mile from Reculver towers, having, at half a mile off, a dry patch, and from thence outwards a general depth of 6 feet.

Buoy.—A can buoy, *striped black* and *white vertically*, lies in 12 feet, to the north-eastward of Reculver sand; with Minster east mill, in line with the western house at St. Nicholas coast-guard station, bearing S.E. by S.; and Herne high mill, in line with the flagstaff of Bishopstone coast-guard station, W.S.W.; Horse buoy, N.W. by W. $\frac{1}{2}$ W., distant $1\frac{1}{4}$ mile; and West Last buoy, N.W. by W., $1\frac{0}{10}$ mile. Birchington seed mill shut in with Cliff-end, leads outside the sand in 10 feet water.

Black Rock, on Reculver flat, has Reculver towers and St. Nicholas church nearly in line, bearing S.E. $\frac{7}{8}$ S., and is distant half a mile from Reculver; it dries only at low-water springs, when it has 3 feet water surrounding it.

HERNE BAY FLATS lie to the north-eastward of Herne bay pier-head, at three-quarters of a mile from which there is a depth of only 3 feet; their outer edge, in 6 feet, is one mile to the northward of the cliff eastward of the town.

HORSE is a narrow ridge of sand, having 8 feet over it, extending to the eastward from, and forming part of, the shallows off the east side of Herne Bay.

Buoy.—A can buoy, *chequered black* and *white*, marked Horse, is moored in 10 feet on this ridge; with Northdown tower just clear of the projecting east cliff of Westgate bay, or Birchington seed mill in line with the western part of the white cliffs at Cliff-end; Middle Last buoy, bearing E.N.E., distant $\frac{4}{10}$ mile; West Last buoy, N.W. $\frac{1}{8}$ W., $\frac{6}{10}$ mile; and Reculver buoy, S.E. by E. $\frac{1}{2}$ E., $1\frac{1}{4}$ mile.

The following shoals bound the northern side of South, Gore, and Horse channels:—

MARGATE SAND is very extensive, and dries for upwards of 3 miles E. by N. and W. by S., and is $1\frac{1}{4}$ mile across; the highest part, nearly 3 miles N. by E. of Cliff-end, is $6\frac{1}{2}$ feet above low-water at spring tides. From this, the sand extends $4\frac{1}{2}$ miles in an easterly direction; there is also a series of dry and shallow patches for nearly the same distance to the westward, among which are the Hook, Last, and Woolpack, making the whole length of Margate sand 9 miles. Its eastern extremity and south-east side are marked as follows:—

Buoys.—East Margate, a conical buoy, *striped horizontally red* and *white*, with staff and diamond, lies in 5 fathoms; with Margate old church spire, in line with the western chimney of Margate baths, bearing S.W. $\frac{1}{4}$ S.; west end of Moro castle, in line with the centre of North Foreland light-house, S. $\frac{7}{8}$ W.; N.E. spit buoy, N.N.W., distant $1\frac{1}{10}$ mile; and Longnose buoy, S. by W. $\frac{1}{4}$ W., $2\frac{6}{10}$ miles. The eastern limit of the *red* sector of North Foreland light passes one cable eastward of East Margate buoy.

S.E. Margate, a *black* conical buoy, in $4\frac{3}{4}$ fathoms, lies off the south spit of the sand; with Bishopstone east coast-guard house, its length open north of Reculvers, bearing W. $\frac{1}{4}$ N.; Powell's belfry, near Birchington, on west side of a block of two houses, S.S.W.; and South Margate buoy, W. by N. $\frac{3}{4}$ N., distant $1\frac{1}{2}$ mile. This spit has extended to the eastward, and to the north-westward of the buoy is a patch of 6 feet, upon which the sea breaks heavily.

CLIFF-END BANKS have 16 to 18 feet over them; they lie about one mile off-shore, and are separated by a very narrow channel from the E.S.E. spit of the Hook, which is marked by South Margate buoy. The best track is to the southward of them.

HOOK SAND may be considered as a continuation of Margate sand, from which it is separated by a narrow passage with 10 feet in it, used only by small craft. The highest part dries 7 feet at low-water.

BUOYS.—The Hook is marked by South Margate, South spit, Hook spit, and East Last, buoys; the three former also define the north side of Gore channel.

South Margate, *black* cylinder, lies in 4 fathoms, on the south edge of the sand; with Mount Pleasant, in line with Birchington west mill, bearing S. ¼ E.; and St. Nicholas church, in line with the west end of the western coast-guard house at St. Nicholas, S.W. ¾ S.; South spit buoy, W. ¾ N., one mile; and S.E. Margate buoy, E. by S. ¾ S., 1½ mile.

South spit, *black* cylinder, in 5 fathoms, off the south spit of the sand; with Birchington west mill, in line with the westernmost barns at Cliff-end farm, bearing S.S.E. ½ E.; and Monkton beacon, just open west of St. Nicholas western coast-guard station, S. ¼ E.; South Margate buoy, E. ¾ S., one mile; and Hook spit buoy, N.W. by W. ½ W., one mile.

Hook spit, *black* cylinder, in 9 feet (near position of former beacon), with Margate old church, touching the east end of the infirmary, bearing S.E. by E. ¾ E.; and Chislet mill, in line with the west end of Vantipier barn, S.W. ⅛ W.; East Last buoy, N.W. by W., distant $\frac{4}{10}$ mile; Horse buoy, W. by N. ⅜ N., 1½ mile; Reculver buoy, W. by S. ¾ S., 3½ cables; and South spit buoy, S.E. by E. ½ E., one mile.

LAST is the western extremity of Margate sand, and has only one foot of water on its shoalest part, which lies N.E. by N. from Reculver.

BUOYS.—Three buoys lie along the southern edge of the Last, and also mark the northern side of Horse channel.

East Last, *black* cylinder, lies in 10 feet, with Minster west mill, in line with the easternmost house of St. Nicholas coast-guard station, bearing S.E. by S.; and Chislet mill, in line with a small house to the eastward of Reculvers coast-guard house, S.W. ¾ S.; Middle Last buoy, N.W. by W. ½ W., distant $\frac{8}{10}$ mile; and Hook spit buoy, S.E. by E., $\frac{4}{10}$ mile.

Middle Last, *black* cylinder, lies in 10 feet, with the west end of Cleve wood, in line with the middle of the eastern high clump of trees in Lower Hale grove, bearing S.E. by S.; and Chislet mill, just open to the westward of Genges farm, S. by W. ⅜ W.; West Last buoy, W. by N. ¾ N., distant $\frac{8}{10}$ mile; and East Last buoy, S.E. by E. ½ E., $\frac{8}{10}$ mile.

West Last, *black* conical buoy, with staff and globe, lies in 12 feet, with Reading Street beacon, in line with the west point of Marsh bay, bearing S.E. by E. ½ E.; and Hillborough church, in line with Bishopstone coast-guard station, S. by W. ¼ W.; Middle Last buoy, E. by S. ⅜ S., distant $\frac{8}{10}$ mile; Horse buoy, S.E. ⅛ E., $\frac{6}{10}$ mile; Whitstable Street buoy, W. ⅞ N., 5½ miles; East Spaniard buoy, N.N.W. ⅞ W., 5 miles; Girdler light-vessel, N. ⅞ W., 5¼ miles; and West Pan-sand buoy, North, $3\frac{2}{10}$ miles.

The EAST SWALE, already noticed on page 248, is the channel between the coast of Kent, near Whitstable, and the south-east side of the

isle of Sheppey, whereby the traffic, consisting chiefly of coal and oysters, is carried on between Faversham and Whitstable, in a small class of vessels. The Swale forms, however, a good shelter in north-east gales, and is a very safe place for a vessel without anchors to run for, as the ground may be taken in soft mud on the north shore inside Shellness, or, with greater safety and convenience, on the mud at Faversham creek. At Harty ferry, opposite Faversham creek, is a hard upon which vessels that have received damage may be laid for examination or temporary repair.

The approach between the Columbine and Whitstable flat is limited to a depth of 8 feet at low-water; therefore, care must be taken in not being too late on the ebb-tide or too soon on the flood when running for it.

Extensive flats occupy nearly the whole of the approach and entrance to the Swale, which are rendered irregular by the following banks and spits:—

WHITSTABLE STREET, on the south side of the entrance to the Swale, is a ridge of compact shingle and large boulders projecting in a N. by E. direction from the west end of Whitstable cliffs for one mile; its outer extremity, which dries, may be cleared by keeping Reculver well open of Herne pier-head, bearing E.S.E.

BUOYS.—Whitstable Street, a *red* and *white vertically striped* conical buoy, with staff and cage, marks the south side of the fairway to the East Swale, and lies in 10 feet nearly one mile to the northward of the extremity of the Street; between, is a hole of deep water, where a small *black* buoy is placed by the fishermen as a guide for the anchorage. At the Street buoy, Harty church is in line with the northernmost house at Shellness, bearing W. $\frac{3}{4}$ S.; and Whitstable church tower is open to the eastward of a white watch-house, S. $\frac{1}{3}$ W.; Pollard spit buoy, W. $\frac{3}{4}$ S., distant 2 miles; and Columbine buoy, N. $\frac{1}{3}$ E., $\frac{9}{10}$ mile.

Pollard Spit is a sandy projection from Whitstable flats, and has a *red* and *white vertically striped* can buoy moored off it in 13 feet, marking the south side of the channel to Shellness; with Harty church, in line with Bells house, bearing W. $\frac{3}{4}$ S.; and a clump of trees on the west part of the high land of Sheppey, in line with the white end of the east mussel-house, N.W. $\frac{3}{4}$ W.; Whitstable Street buoy, E. $\frac{3}{4}$ N., distant 2 miles; and Ham gat buoy, N.W. $\frac{3}{4}$ W., $\frac{4}{10}$ mile.

COLUMBINE SAND lies on the flat outside Shellness, and dries 2 feet at low-water; it is marked by three buoys moored on the north side of the channel of the East Swale, as follows:—

BUOYS.—Columbine, *red* can, off the eastern shallow spit of the sand, is moored in 5 feet, with Whitstable church tower, to the eastward of

a small lead-coat house on the cliff, bearing S. ¾ W.; and the mill in line with the south-west side of Ruth's house, S.W. by W. ½ W.; East Spaniard buoy, E.N.E. ¼ E., distant 4½ miles; West Spaniard buoy, E.S.E. ¾ E., 2½ miles; West Pyramid buoy, E. by S. ¾ S., 3½ miles; and Columbine spit buoy, N.W. by W. ½ W., 2½ miles.

Columbine spit, *red can*, has 3 feet, near the east end of the sand, which dries at low-water; with Whitstable church in line with the "Pyramid's dome," bearing S. by E.; Horse gat buoy, W. by S. ½ S., distant 1¼ mile; and Columbine buoy, N.E. by E. ¾ E., ⅔ mile.

Horse gat, *red can*, in 3 feet, marks the narrow passage between the west end of the Columbine and the flat adjoining Shelbrow.

HORSE is a shoal on the north side of the Swale, 1¼ mile within Shelbrow; it dries 4 or 5 feet at low-water.

Sand End buoy.—A *red can buoy* lies in 7 feet on the eastern edge of the Horse.

Directions for the East Swale are given on page 228.

OVERLAND PASSAGE extends from the West Last to the Nore; it is bounded on the north-east by the Spaniards, the Middle and the Sylie, and to the south-west by Columbine sand and the extensive flat which fronts the isle of Sheppey; there is as little as 4 feet depth in it at low-water upon the inner tail of the East Spaniard. To the westward of the Spaniard it is connected with Four-Fathoms channel.

FOUR-FATHOMS CHANNEL, so called from the depth in it at high-water, is bounded on the south by the Spaniards and the flat upon which they are based, and on the north by the Gilman, Middle, and Sylie.

SPANIARD consists of two shoals, the Spaniard and East Spaniard. The Spaniard is nearly one mile in length, E. by S. and W. by N., and the least water over it is 2 feet. The East Spaniard projects from the Sheppey flat 4 miles in an E. ¾ N. direction, and has as little as one foot water upon it.

BUOYS.—The northern limit of these shoals is indicated by three buoys, which also mark the south side of Four-Fathoms channel.

East Spaniard, a conical buoy, *striped vertically black* and *white*, with staff and cage, lies in 15 feet, with the east side of Herne high mill, midway between the clock tower and low mill at Herne bay, bearing S. ¼ E.; Whitstable high mill, in line with the easternmost coke chimney at Whitstable, S.W. by S.; Middle Spaniard buoy, W. ½ S., distant

$2\frac{7}{10}$ miles; East Middle buoy, W. $\frac{1}{4}$ N., $2\frac{1}{10}$ miles; East Gilman buoy, N.E. $\frac{2}{3}$ N., $1\frac{5}{10}$ mile; Girdler light-vessel, N.E. by E. $\frac{1}{8}$ E., 2 miles; West Pan-sand buoy, E. by S. $\frac{3}{4}$ S., $2\frac{8}{10}$ miles; West Last buoy, S.S.E. $\frac{7}{8}$ E., 5 miles; and Whitstable Street buoy, S.W. $\frac{1}{3}$ S., $4\frac{1}{4}$ miles.

Middle Spaniard, a *chequered black* and *white* can, lies in 13 feet, with the miller's house at Herne high mill, in line with the west end of the coast-guard station at Herne bay, bearing S.S.E. $\frac{1}{3}$ E.; and two conspicuous barns, in line with the "Pearson's Arms," S. $\frac{1}{4}$ W.; West Spaniard buoy, W. by N. $\frac{3}{4}$ N., distant $1\frac{1}{2}$ mile; and East Spaniard buoy, E. $\frac{1}{2}$ N., $2\frac{7}{10}$ miles.

West Spaniard, a conical buoy, *striped vertically black* and *white,* lies in 10 feet to the north-westward of the west end of the Spaniard; with Minster west mill, in line with the Reculvers, bearing S.E. $\frac{1}{3}$ E.; and Whitstable church tower, in line with the "Pearson's Arms," S. by E.; Spile buoy, N.W. $\frac{3}{4}$ W., distant 2 miles; Nore light-vessel, N.W. $\frac{1}{2}$ W., $5\frac{3}{4}$ miles; and Middle Spaniard buoy, E. by S. $\frac{3}{4}$ S., $1\frac{1}{2}$ mile.

Spaniard Swash is the passage between the Spaniard shoals.

GILMAN is a narrow bank lying north one mile from the east end of the East Spaniard, and has a depth of 8 feet upon it, with Herne high and low mills in line.

Buoy.—East Gilman, can buoy, *chequered black* and *white,* is placed in 19 feet on the east tail of the Gilman; with Reculvers, its length eastward of Sarr mill, bearing S. by E. $\frac{2}{3}$ E.; and the east coke chimney at Whitstable, nearly midway between the western chimney and Whitstable high mill, S.W. by S.; Shivering sand buoy, N.N.E. $\frac{1}{4}$ E., distant one mile; Girdler light-vessel, E. by S., $\frac{9}{10}$ mile; North Pan-sand buoy, S.E. $\frac{3}{4}$ E., $2\frac{3}{10}$ miles; West Pan-sand buoy, S.E. $\frac{1}{2}$ S., $2\frac{3}{4}$ miles; and East Spaniard buoy, S.W. $\frac{2}{3}$ S., $1\frac{5}{10}$ mile.

MIDDLE is an extensive sand drying $2\frac{1}{2}$ feet for one mile in a N.E. by E. and S.W. by W. direction. It is marked as follows:—

BEACON and BUOYS.—Middle Beacon, surmounted by a cage, 45 feet above low-water, stands towards the eastern end of a ridge which dries to the southward of the main sand.

East Middle buoy, *black* can, lies in 12 feet, with Sheerness dockyard chapel, just open north of the Middle beacon, bearing W. by N. $\frac{1}{3}$ N.; the Mussel-houses, their breadth open westward of the third building west of Harty church, S.W. by W. $\frac{1}{4}$ W.; Middle beacon, W. by N. $\frac{1}{4}$ N., distant one mile; Middle Spaniard buoy, W. $\frac{3}{4}$ S., one mile; and East Spaniard buoy, E. $\frac{1}{3}$ N., $1\frac{3}{4}$ mile.

South Middle, *black* can, lies in 12 feet, with the tree eastward of Herne high mill, in line with the east end of Herne bay coast-guard station, S.S.E. ½ E.; and Minster mill, in Sheppey, just open to the northward of West Spaniard buoy, W. ¼ N.; West Middle buoy, W.N.W., distant 1¼ mile; and East Middle buoy, E. by S., $1\frac{1}{10}$ mile.

West Middle, *black* can, lies in 9 feet, with the west end of Cleve wood touching Reculvers, bearing S.E. ¼ E.; and Whitstable church tower, its breadth southward of the "Pearson's Arms," S. by E.; Spile buoy, N.W. by W. ⅓ W., distant 1½ mile; and South Middle buoy, E.S.E., 1¼ mile.

Spile, *black* can, lies in 12 feet, at the western extremity of Spile sand (described on page 267), with Shottenden mill, in line with a conspicuous gap between two woods eastward of Leysdown church, bearing S.S.W.; and Minster east mill, just open to the southward of Reculvers, S.E. ⅓ E.; Nore light-vessel, N.W. ¼ W., distant $3\frac{8}{10}$ miles; Sheerness Middle buoy, N.W. by W. ¼ W., $4\frac{2}{10}$ miles; West Middle buoy, S.E. by E. ⅓ E., 1½ mile; and West Spaniard buoy, S.E. ¾ E., 2 miles.

CANT FLAT extends in an easterly direction from the low north-west end of Minster cliffs, and carries general depths of 7 to 10 feet between one and 2¼ miles off shore, but Cheney spit, with 6 feet on it, has the Nore light-vessel bearing North, rather more than one mile distant, and Sheerness Middle buoy (*black*), N.W. ¾ W., 1¼ mile.

To the eastward of this part of the Cant, and on the outer margin of the flat, is the East Cant, or Cant-edge shoal, marked by a *chequered black* and *white* can buoy, described on page 243.

ANCHORAGES.—In the foregoing channels the following anchorages are generally used :—

Westgate Road affords good shelter in gales from the south-west and south-east, and is partly protected from northerly winds by Margate sand. The best anchorage is in 6 fathoms, sand and mud, with Minster mills in line with the west cliff of Westgate bay, and Foreness open of Margate pile landing pier.

The Góre, or "Under the Hook," as it is frequently termed, is a roadstead much used by small vessels. The Hook and Margate sands give protection and break the sea in north-east gales, and during the time these shoals are uncovered (which is eight hours in every twelve) the water is smooth. Anchorage may be taken in any convenient position to the southward of Hook sand, with Monkton beacon, in line with Upper Hale grove, bearing S. ½ E., or at about one-quarter mile south of the Hook buoys.

Off Whitstable.—If bound to Whitstable harbour and obliged to wait, a vessel should anchor in Fisherman's Hole, off the Street, keeping Reculver well open of Herne bay pier, bearing E.S.E.; and Whitstable buoy, N. by W. $\frac{1}{4}$ W., half a mile. As before stated, a small black buoy is at times kept here by the fishermen.

East Swale.—If obliged to anchor outside, a vessel drawing more than 10 feet will find a good berth in 16 feet, clay, close to the southward of Columbine spit buoy.

The general anchorage of the East Swale is very safe and good, in $3\frac{3}{4}$ fathoms, at about one-quarter of a mile inside Shellness, at any convenient distance off shore.

Four-Fathoms Channel.—In the east end of this channel, between the East Spaniard and East Middle buoys, vessels of 13 to 14 feet draught will find anchorage; but to the westward of the Middle Spaniard there is not generally depth for a vessel drawing more than 10 feet. If drawing as much as 11 or 12 feet, and it be necessary to anchor, the best berth is at 2 cables to the south-west of the South Middle or Spile buoys.

Directions for South Channel.—From off the North Foreland steer to the Northward and N.N.W., according to the distance off shore, to pass outside the Longnose buoy, taking care to keep North Foreland lighthouse open to the eastward of Neptune tower on Whiteness, bearing S. by W. $\frac{1}{4}$ W., until Birchington north or seed mill is open of Fort point, Margate, bearing West, southerly; or, if at night, keep North Foreland light bearing S. by W. $\frac{1}{4}$ W. until Margate pier *red* light opens to view, W. $\frac{2}{3}$ S.; a W. by N. northerly course for 7 miles will then lead to the southward of the S.E. Margate, South Margate, and South spit buoys, passing over Cliff-end banks and through Gore channel, to one-quarter of a mile southward of the South spit buoy, from which position St. Peter's church, with a square tower, in Thanet, will be over the white coast-guard houses at Westgate bay, bearing S.E. by E. easterly. The best track, however, is to the southward of Cliff-end banks, keeping Foreness (seen over Margate pile landing-pier), bearing E. by S. $\frac{1}{2}$ S., until abreast South Margate buoy. In working, Chislet mill open of Cliff-end will clear Nayland ledge, and Foreness open of Fort point clears the projecting ledges between Margate infirmary and Cliff-end; but the lead is the best guide, particularly if the weather be hazy, when it is more difficult to estimate the distance from the cliffs. From the above position near the South spit buoy, a N.W. by W. $\frac{1}{2}$ W. course, for 3 miles, will lead through Horse channel to one cable to the southward of West Last buoy, and between Hook spit and the three buoys upon the Last (all *black*) to the north-eastward, and the *black* and *white striped* buoy of the Reculvers, and the *black* and *white chequered* buoy of the Horse, to the

south-westward. This channel is narrow and irregular in depth, and no good sailing or working marks can be given for it.

CAUTION.—Horse channel should not be navigated at night, as it is not lighted; nor at low-water springs by vessels drawing more than 9 feet. Great attention must be paid to the period of tide and to the lead.

From West Last buoy by Overland Passage.—The course from one cable south of West Last buoy to 3 cables south of West Spaniard buoy is N.W. by W. $\frac{1}{4}$ W. for 8 miles. In this track, allowance must be made for the tidal stream, which runs in a westerly direction during the flood, and easterly during the ebb. This course passes above one mile north-east of Columbine buoy, and across a depth of 4 feet only upon the narrow ridge which connects the East Spaniard with the flat in front of Sheppey. It may be observed, as a guide to vessels bound up, that when Hook sand is covered, there is 11 feet in this passage. From 3 cables southward of West Spaniard buoy as above, steer N.W. $\frac{1}{4}$ W. for nearly 6 miles to the Nore light-vessel, passing one cable to the south-westward of the Spile buoy, and taking care to allow for a stream setting W.N.W. during the flood tide, and E.S.E. during the ebb.

From West Last buoy through Four-Fathoms Channel.—Steer N.N.W. $\frac{3}{4}$ W. for 5 miles over the Kentish flats, which have in several places but 11 feet upon them, to East Spaniard buoy, making allowance for the stream which sets nearly abeam. Pass close to the northward of East Spaniard buoy, and steer W. $\frac{1}{2}$ S. for $2\frac{3}{4}$ miles, which will lead to between Middle Spaniard buoy and Middle beacon; thence a W. by N. $\frac{3}{4}$ N. course for the town of Sheerness, for $2\frac{1}{3}$ miles, leads one cable to the northward of West Spaniard buoy, and 2 cables south of West Middle buoy, which having passed half a mile, alter course to N.W. $\frac{1}{4}$ W. for the Nore light-vessel.

From West Last buoy into the East Swale.—From West Last buoy the direct course for the Swale is W. by N. to Whitstable Street buoy, but as this leads over some 5-feet patches, it is necessary to keep farther out when the tide is low, by steering W. by N. $\frac{3}{4}$ N. until Shellness coast-guard houses appear midway between Harty church and the fishery beacon upon the ness, bearing W. by S. southerly, and proceed with them so into the Swale towards Shellness, passing to the southward of Columbine buoys, and northward of Whitstable Street and Pollard buoys. When near Pollard buoy, a S.W. by W. $\frac{1}{2}$ W. course, keeping Shellness on the starboard bow, will lead inside, where anchorage may be taken as convenient.

From the Nore outwards by South Channel.—When at the Nore, it will very much depend upon the period of tide, and the force

and direction of the wind, as to which channel a vessel should take. If the tide is more than half-flood, with a leading wind, the Overland passage or Four-Fathoms channel may be selected as being the shortest route. Steer S.E. $\frac{1}{4}$ E. from the Nore light-vessel, which course for nearly 6 miles, allowing for the stream setting on the port bow with the flood tide, and on the starboard quarter with the ebb, will lead to the southward of the Spile and West Middle buoys, to about 3 cables south of West Spaniard buoy; thence proceed by the Overland passage, S.E. by E. $\frac{1}{4}$ E. for 8 miles, to one cable south of West Last buoy, from which a S.E. by E. $\frac{1}{2}$ E. course for 3 miles will lead through Horse channel to one-quarter of a mile southward of South spit buoy, when E. by S. southerly may be steered down South channel and through Margate road. Keep three-quarters of a mile off shore below Margate, and when North Foreland lighthouse bears S. by W. $\frac{1}{4}$ W., a S.S.E. $\frac{3}{4}$ E. course will clear all dangers.

QUEEN'S, PRINCE'S, ALEXANDRA, AND BULLOCK CHANNELS, OAZE DEEP, AND KNOB CHANNEL.

QUEEN'S CHANNEL is formed between Margate sand and the Wedge to the southward, and Tongue and Pan sands to the northward. Margate sand, and the objects marking its east and southern sides, have been described on page 251; its north-eastern limit is indicated by two buoys.

WEDGE is a ridge with 13 to 24 feet water over it, detached from the North spit and north side of Margate sand by depths of 5 and 6 fathoms.

Buoy.—The Wedge is marked by a *red* and *white vertically striped* can buoy.

SOUTH KNOLLS are several distinct sand ridges on the eastern side of the Kentish flats to the north-west of Margate sand, having 12 to 15 feet and strong tide ripples over them.

Buoy.—A *chequered red* and *white* can buoy lies just to the eastward of the South Knolls.

TONGUE SAND mainly separates Queen's and Prince's channels, and lies in an E.S.E. and W.N.W. direction, $3\frac{1}{2}$ miles in length from a depth of 4 fathoms on each extremity, and nearly half a mile across at its widest part; the least depth upon it, 3 feet, is towards its west end. The buoys marking this sand are described on pages 260, 261, 263.

PAN SAND is irregularly formed, and a narrow projection from its east side, called the Ridge, nearly connects it with the west end of the Tongue. It lies in a general east and west direction for nearly $2\frac{3}{4}$ miles, between depths of 2 fathoms, and a patch upon it dries 2 feet at low-water.

Three *red* buoys and a beacon mark the southern limits of this shoal, and two buoys, *black* and *white chequered*, and *black* and *white striped*, lie off its northern side. The space included between Pan sand and South Knolls is called Pan-sand Hole.

BUOYS on South Side of Queen's Channel.—N.E. Spit, a large conical buoy, *striped vertically red* and *white*, lies in 8 fathoms, upon the north-east extremity of Margate sand; with Neptune tower, its width eastward of the garden wall of North Foreland light-house, bearing S. $\frac{1}{4}$ W.; and Margate old church spire, in line with the chancel end of Margate new church, S.S.W. $\frac{3}{8}$ W.; Tongue Knoll buoy, N. by W. $\frac{3}{8}$ W., distant $2\frac{3}{10}$ miles; Tongue light-vessel, N.W. $\frac{1}{8}$ W., $3\frac{6}{10}$ miles; and North Spit buoy, W. by N. $\frac{3}{8}$ N., 3 miles.

North Spit, *chequered red* and *white* can, lies in $8\frac{1}{2}$ fathoms, on the steep edge of the North spit of Margate sand. From this buoy, St. Peter's church, near Broadstairs, appears in line with a gap in the cliff near Margate eastern coast-guard house, bearing S. by E. $\frac{1}{4}$ E.; St. Nicholas church is in line with St. Nicholas easternmost coast-guard house, S.W. $\frac{1}{4}$ S.; Wedge buoy, W. $\frac{1}{8}$ N., distant $2\frac{4}{10}$ miles; East Tongue buoy, N. $\frac{1}{3}$ E., $1\frac{2}{10}$ mile; N.E. Spit buoy, E. by S. $\frac{3}{8}$ S., 3 miles; and Tongue light-vessel, N. $\frac{1}{3}$ E., $1\frac{4}{10}$ mile.

Wedge, can, *striped vertically red* and *white*, lies in 4 fathoms, off the north side of Wedge shoal; with Minster mills, in line with the coast-guard house in Apple bay, bearing S. $\frac{1}{2}$ E.; and Monkton beacon, in line with the middle of Lower Hale grove, S. by W. $\frac{1}{8}$ W.; South Knoll buoy, W.N.W., distant 3 miles; East Tongue buoy, E.N.E., $2\frac{3}{4}$ miles; and North Spit buoy, E. $\frac{1}{8}$ S., $2\frac{4}{10}$ miles.

South Knoll, *chequered red* and *white* can, lies in 16 feet, off the east side of South Knolls; and from it, Margate mills are in line with Margate new church tower, bearing S.E.; Minster west mill and Birchington west mill are in line, S.S.E.; West Pan-sand buoy, N.W. by W. $\frac{1}{4}$ W., distant $1\frac{6}{10}$ mile; and Wedge buoy, E.S.E., 3 miles.

BUOYS and BEACON on North Side of Queen's Channel.—Tongue Knoll, conical buoy of large size, *striped black* and *white horizontally*, is in $5\frac{1}{2}$ fathoms, off the eastern extremity of the long spit from Tongue sand; with Neptune tower, midway between the towers of Moro castle, bearing S. $\frac{1}{3}$ E.; and Margate new church, its length to the westward of a black mill, S. by W. $\frac{1}{4}$ W.; N.E. Spit buoy, S. by E. $\frac{3}{8}$ E., distant $2\frac{3}{10}$ miles; Tongue light-vessel, W. $\frac{1}{4}$ N. northerly, 2 miles; and Shingles beacon, W.N.W., $3\frac{9}{10}$ miles.

East Tongue, a *red* and *white horizontally striped* can, lies in 4 fathoms, on the ridge of Tongue sand; with St. Nicholas church, just

open to the westward of St. Nicholas western coast-guard house, bearing S.W. $\frac{3}{4}$ S.; Minster west mill, in line with the cliff on the east side of Westgate bay, S. by W. $\frac{1}{8}$ W.; West Tongue buoy, W. $\frac{1}{3}$ N., distant $2\frac{1}{10}$ miles; Tongue light-vessel, N. $\frac{1}{2}$ E., $\frac{3}{10}$ mile; N.E. Tongue buoy, W. by N. $\frac{1}{2}$ N., $1\frac{8}{10}$ mile; and N.E. Spit buoy, S.E. $\frac{3}{4}$ E., $3\frac{4}{10}$ miles.

West Tongue, *red* can, lies in 4 fathoms, with St. Peter's church, open of the cliff to the westward of Margate new church, bearing S.S.E. $\frac{1}{4}$ E.; Monkton beacon, in line with the east side of Lower Hale grove, S. by W. $\frac{1}{4}$ W.; Pan Patch buoy, W. $\frac{1}{3}$ N., distant $2\frac{1}{2}$ miles; and East Tongue buoy, E. $\frac{1}{3}$ S., $2\frac{1}{10}$ miles.

Pan Patch, *red* can, lies in 4 fathoms, off the south-east tail of Pan sand, upon which is a depth of 17 feet. From the buoy, Reading Street beacon and Margate new church are in line, bearing S.E. $\frac{1}{3}$ S.; Monkton beacon is in line with the west end of Upper Hale grove, S. $\frac{2}{3}$ E.; Pan-sand spit buoy, W. $\frac{1}{3}$ N., distant $\frac{7}{10}$ mile; and West Tongue buoy, E. $\frac{1}{3}$ S., $2\frac{1}{2}$ miles.

Pan-sand Spit, *red* can, is placed in 4 fathoms, off the south-east spit of Pan sand, upon which is 4 feet of water; with Powell's belfry, open to the westward of Birchington church spire, bearing S.S.E.; Monkton beacon, just open west of Upper Hale grove, S. by E.; West Pan-sand buoy, W. by N. $\frac{1}{2}$ N., distant $1\frac{1}{2}$ mile; and Pan Patch buoy, E. $\frac{1}{3}$ S., $\frac{7}{10}$ mile.

Pan-sand Beacon, surmounted by a cage, 44 feet above low-water, stands on the south-west elbow of that portion of the sand which dries. The marks for it are, St. Peter's church, in line with Margate infirmary, bearing S.E. $\frac{1}{2}$ S.; and Hillborough church, in line with Bishopstone coast-guard house, S. by W. $\frac{1}{4}$ W.

West Pan-sand, a *red* conical buoy, with staff and globe, lies in 12 feet, off the south-west spit of Pan sand; with Margate mills, just open to the southward of Margate new church, bearing S.E. $\frac{1}{4}$ E.; and Ash church, midway between Sarr windmill and Reculvers, S. $\frac{1}{2}$ E.; East Spaniard buoy, W. by N. $\frac{3}{4}$ N., distant $2\frac{8}{10}$ miles; East Gilman buoy, N.W. $\frac{1}{2}$ N., $2\frac{3}{4}$ miles; Girdler light-vessel, N.N.W., $2\frac{2}{10}$ miles; South Knoll buoy, S.E. by E. $\frac{1}{4}$ E., $1\frac{6}{10}$ mile; and Pan-sand Spit buoy, E. by S. $\frac{1}{2}$ S., $1\frac{1}{2}$ mile.

PRINCE'S CHANNEL is bounded on the south by Tongue and Pan sands, already described, and northern edge of the Flats, and on the north by Shingles and Girdler sands. This channel being lighted, as well as defined by beacons and buoys, and the depth of water through being 6 feet greater than in Queen's channel and over the Kentish Flats, besides being a more direct route, has nearly superseded Queen's channel, excepting with a turning wind, when the latter, being the wider is at times preferred.

SHINGLES SAND lies on the southern portion of the flat of the Girdler, and a large part of it, in line with St. Peter's church and Margate mills, bearing S. by E. $\frac{1}{2}$ E., dries about 6 feet above the level of low-water. The south extremity is steep-to, and marked by a beacon; and a *red* buoy lies to the south-west of the sand.

GIRDLER.—The Girdler is continually undergoing change; it is now divided into two portions, East and West Girdler. The former is a sand about 5 miles long East and West, and $2\frac{1}{2}$ miles broad North and South, having upon it several large dry patches, of which the Shingles, just referred to, is the south-easternmost. West Girdler, $3\frac{1}{2}$ miles long and half a mile broad, runs parallel to the south-western side of East Girdler, Alexandra channel dividing the two; the latter shoal also forms the north-western boundary of Prince's channel. Two light-vessels, a beacon, and three *black* buoys mark the south side of West Girdler.

TONGUE LIGHT-VESSEL, at the eastern entrance to Prince's channel, is moored in 10 fathoms off the north side of the ridge of Tongue sand, and one mile north of the fairway in Queen's channel. She carries two *fixed* lights; the higher light is *white*, and the lower light, shown from a house at the after part of the vessel, is *red*; they are, respectively, 34 and 10 feet above the water, and visible at the distances of 10 and 4 miles.

Fog Signal.—A gong is sounded during thick or foggy weather.*

The vessel lies with Minster mill, just open westward of the east cliff, Westgate bay, bearing S. by W. $\frac{1}{4}$ W.; Margate old church tower, open to the eastward of Margate pier lighthouse, S. $\frac{1}{8}$ E.; Shingles beacon, N.W. $\frac{1}{2}$ W., $2\frac{7}{10}$ miles; East Tongue buoy, S. $\frac{1}{2}$ W., $\frac{3}{10}$ mile; N.E. Spit buoy, S.E. $\frac{1}{8}$ E., $3\frac{6}{10}$ miles; Prince's channel light-vessel, W.N.W. westerly, $4\frac{1}{10}$ miles; Girdler light-vessel, W. by N. $\frac{3}{8}$ N., $7\frac{0}{10}$ miles; and Tongue Knoll buoy, E. $\frac{1}{2}$ S. southerly, 2 miles.

Vessels should always pass to the northward of the light-vessel.

PRINCE'S CHANNEL LIGHT-VESSEL lies in 4 fathoms, on the north side of the channel, off the south-east spit of the West Girdler, and exhibits a *revolving red* light, showing a *flash every twenty seconds*, at 35 feet above the water, visible in clear weather at the distance of 10 miles.

Fog Signal.—A gong is sounded during thick or foggy weather.*

From the vessel, St. Peter's church is over Margate pier lighthouse, bearing S.S.E. $\frac{3}{4}$ E.; Minster west mill, its apparent length to the eastward

* *See* Regulations respecting light-vessels, foot note, page 101.

of Powell's belfry, S. by E.; Monkton beacon, in line with the east side of Upper Hale grove, and between St. Nicholas coast-guard houses, South (easterly); Girdler Spit buoy, N. $\frac{1}{4}$ E., distant 2 cables; Girdler light-vessel, W. by N. $\frac{1}{3}$ N., $3\frac{8}{10}$ miles; Tongue light-vessel, E.S.E. easterly, $4\frac{1}{10}$ miles; Shingles Spit buoy, E. by S. $\frac{1}{8}$ S., $1\frac{9}{10}$ mile; and S.E. Girdler buoy, W. by N. $\frac{1}{2}$ N., 5 cables.

Alexandra channel is to the northward of this light-vessel.

GIRDLER LIGHT-VESSEL is moored in 19 feet, at 3 cables to the south-west of the western spit of Girdler sand, and serves to mark the north-west entrance to Prince's channel. The vessel exhibits a single *white* light, which emits a *flash every half-minute*, at an elevation of 36 feet above the sea, visible in clear weather at the distance of 10 miles.

Fog Signal.—A gong is sounded during thick or foggy weather.*

From the vessel, the west end of Cleve wood is just open westward of St. Nicholas east coast-guard station, bearing S.S.E. $\frac{1}{4}$ E.; Ash church spire is just open eastward of St. George's farm, S. $\frac{3}{4}$ E.; Northdown tower is in line with Pan-sand beacon, S.E. $\frac{1}{8}$ S.; East Spaniard buoy, S.W. by W. $\frac{1}{3}$ W., distant 2 miles; East Gilman buoy, W. by N., $\frac{9}{10}$ mile; Shivering sand buoy, N. by W. $\frac{7}{8}$ W., $1\frac{2}{10}$ mile; Knob buoy, N. by E. $\frac{1}{3}$ E., 2 miles; West Girdler buoy, N.E. $\frac{1}{8}$ E., $\frac{3}{10}$ mile; South Girdler buoy, E. $\frac{2}{3}$ S., $1\frac{6}{10}$ mile; North Pan-sand buoy, S.E. $\frac{1}{2}$ S., $1\frac{6}{10}$ mile; and West Last buoy, S. $\frac{7}{8}$ E., $5\frac{3}{10}$ miles.

Girdler light-vessel having been moved to the south-westward of her original position on the west spit of the sand, and West Girdler buoy placed there, she now covers a 17-feet patch; and the deepest water being in the channel between the above buoy and the vessel, it is necessary to pass to the north-eastward of her.

BUOYS on South Side of Prince's Channel.—Tongue Knoll, and East Tongue buoys, to the eastward of Tongue sand, mark also the north side of the eastern entrance to Queen's channel, with which they have been described (pages 260, 261).

N.E. Tongue, *black* and *white vertically striped* cylinder, lies in $4\frac{1}{2}$ fathoms on the north-east side of the sand, and W. by N. $\frac{1}{2}$ N., $1\frac{8}{10}$ mile from East Tongue buoy; with St. Peter's church tower, in line with Margate new church tower, bearing S.S.E.; Monkton beacon, in line with the east end of Lower Hale grove, S. by W. $\frac{1}{4}$ W.; Shingles beacon, N. $\frac{3}{4}$ E., distant $1\frac{1}{10}$ mile; North Tongue buoy, W. by N. $\frac{3}{4}$ N., $1\frac{7}{10}$ mile; and Prince's channel light-vessel, N.W. by W. $\frac{1}{4}$ W., $2\frac{4}{10}$ miles.

North Tongue, *black* and *white vertically striped* conical buoy, with staff and cage, lies in 6 fathoms, close to the north-west of the shoalest part

* *See* Regulations respecting light-vessels, foot note, page 101.

of the Tongue; with the west end of Cleve wood, just open to the n
ward of Birchington west mill, bearing S. ½ E.; Monkton beacon, j
open to the southward of St. Nicholas eastern coast-guard station, S. ¼
N.E. Pan-sand buoy, W. ¾ N., distant 1 5/10 mile; Girdler spit bu
N.N.W. ¼ W., one mile; and Girdler light-vessel, W.N.W., 4½ miles.

N.E. Pan-sand, *black* and *white chequered* can, lies in 7½ fathom
close off the north side of Pan sand, and half a mile to the eastward
small patch which dries. From the buoy, Northdown monument is o
the chancel of Margate new church, bearing S.E. ¼ S.; and Monk
beacon is in line with the west end of Upper Hale grove, S. ¾
North Pan-sand buoy, W. ½ N., distant 1 5/10 mile; Girdler light-ve
N.W. by W. ¼ W., 3 miles; and Girdler beacon, N. by E. ¼ E., 5/10 mi

North Pan-sand, *black* and *white vertically striped* can, lie
5 fathoms, at half a mile to the northward of the west end of the sand,
near the eastern margin of the Flats; with St. Peter's church, in
with Margate infirmary, bearing S.E. ½ S.; Herne bay coast-guard ho
S.S.W. ½ W.; East Spaniard buoy, W. ½ N., distant 2 3/10 miles; Gi
light-vessel, N.W. ½ N., 1 5/10 mile; Girdler beacon, E. by N. ¾ N., 1 5/10
and West Pan-sand buoy, S. by W., ¾ mile.

**BEACONS and BUOYS on North side of Prin
Channel.**—The following beacons and buoys mark the north s
this channel:—

S.E. Shingles, a *black* conical buoy with staff and globe,
6 fathoms, off the south-east side of the Shingles; with Monkton b
midway between Lower Hale grove and Cliff-end farm, bearing S.
St. Peter's church, just open eastward of Margate eastern coas
station, S. by E.; Shingles beacon, W. by N. ¼ N., distant 1 3/10
Shingles spit buoy, W. ¼ N., 1 5/10 mile; Tongue light-vessel, S. by
1 5/10 mile; and Tongue knoll buoy, S.E. by E. ¼ E., 2 5/10 miles.

Shingles Beacon, with a diamond-shaped boat, elevated
above low-water, is erected on the southern side of the sand
1¼ cable within the spit; and from it St. Peter's church in one-th
Margate mills towards Margate new church, bearing S. by
Chislet mill is in line with the coast-guard station at Reculvers, S
Shingles spit buoy, S.W. ¼ W., 1 5/10 mile; and N.E. Tongue buoy,
1 5/10 miles.

Shingles Spit, red conical buoy, lies in 5 fathoms, off
western dry portion of the Shingles; with Chislet mill, in
Reculvers coast-guard station, bearing S.W. ¼ S.; Mount Pl
in line with a large house next west of Birchington church, S. ½

Shingles buoy, N.W. by W., distant $\frac{9}{10}$ mile; Shingles beacon, N.E. $\frac{1}{4}$ E., $\frac{4}{10}$ mile; and Tongue light-vessel, S.E. by E. $\frac{1}{3}$ E., $2\frac{2}{10}$ miles.

Then occurs Prince's channel light-vessel described on page 262.

S.E. Girdler buoy, a *black* can, lies in $3\frac{1}{2}$ fathoms; with Prince's channel light-vessel bearing E. by S. $\frac{1}{2}$ S., distant 5 cables; and Girdler beacon, N.W., 5 cables.

Girdler Beacon, stands to the southward of the dry portion of West Girdler; it has a triangular head 45 feet above the level of low-water. From it, St. Peter's church tower is open to the eastward of Margate old church, bearing S.S.E. $\frac{7}{8}$ E.; Birchington west mill is in line with the east end of Cleve wood, S. by E. $\frac{1}{4}$ E.; Girdler light-vessel, W. by N., distant $2\frac{9}{10}$ miles; and South Girdler buoy, W. by N. $\frac{1}{3}$ N., $1\frac{1}{3}$ mile.

South Girdler, *black* can, lies in 18 feet, upon a spit from West Girdler; with Northdown monument, open to the southward of Margate new church, bearing S.E. $\frac{1}{2}$ S.; and Herne high mill, over the end of the cliffs east of Herne bay, S.S.W.; Girdler light-vessel, W. $\frac{3}{4}$ N., distant $1\frac{6}{10}$ mile; West Girdler buoy, W. by N. $\frac{1}{2}$ N., $1\frac{4}{10}$ mile; and Prince's channel light-vessel, E. by S. $\frac{3}{4}$ S., $2\frac{1}{3}$ miles.

West Girdler, *black* spherical buoy, is in 21 feet, immediately to the southward of the west spit of the sand; with Mount Pleasant, midway between two coast-guard stations, bearing S.S.E. $\frac{3}{4}$ E.; and Ash church spire a little open west of Reculver village, S. $\frac{3}{4}$ E.; Girdler light-vessel, S.W. $\frac{1}{8}$ W., distant $\frac{3}{10}$ mile; East Gilman buoy, West, $1\frac{1}{10}$ mile; and Shivering sand buoy, N.W. $\frac{7}{8}$ N., $1\frac{1}{10}$ mile.

ALEXANDRA CHANNEL.—A channel of comparatively recent formation, has the Shingles and the East Girdler to the north-eastward, and the West Girdler to the south-westward. It is narrow and somewhat irregular in depth at its inner or north-west end, but as it admits of a nearly straight course being steered from Tongue light-vessel to Mouse light-vessel in the West Swin, it is particularly convenient for steam-vessels, and for sailing vessels with a leading wind. It is too narrow for a vessel of burden to work in.

BUOYS on S.W. side of Alexandra Channel.—Prince's channel light-vessel lies close to the south-east point of the West Girdler, and thus serves as a divisional mark between Prince's and Alexandra channels.

Girdler Spit, a *red* and *white vertically striped* can, lies in 4 fathoms, on the north-east side of the south-east spit of the West Girdler with Minster west mill, touching the east side of Powell's belfry, bearing S. by E.; and Chislet mill to the southward of George's farm, S.S.W.;

Prince's channel light-vessel, S. ¼ W., distant 2 cables; N.E. Girdler buoy, N.W. ¼ W., $1\frac{1}{10}$ mile.

N.E. Girdler, a *red* and *white vertically striped* can, lies in 5 fathoms; with Northdown tower, one-third the distance from Margate mills towards Reading Street beacon, S.E. by S.; and St. Nicholas church, in line with the Girdler beacon, South; Girdler elbow buoy, N.W. by W., $1\frac{9}{10}$ mile; and Girdler spit buoy, S.E. ⅛ E., $1\frac{1}{10}$ mile.

Girdler Elbow, a *red* and *white vertically striped* can, lies in 4 fathoms; with Girdler beacon, shut in its length upon Foreness, bearing S.E. ¾ S.; and Georges farm, open to the westward of Pan-sand beacon, S. ¾ W.; North Girdler buoy, W. ½ N., distant $\frac{9}{10}$ mile; N.W. Shingles buoy, N.N.W. ½ W., $\frac{7}{10}$ mile; Shivering sand buoy, W. by N. ¼ N., $2\frac{4}{10}$ miles; and N.E. Girdler buoy, S.E. by E., $1\frac{2}{10}$ mile.

North Girdler, a *red* and *white vertically striped* can, lies in 5 fathoms, about midway along the north-west side of the West Girdler; with Reading Street beacon, in line with Margate mills, bearing S.E. ⅜ S.; and Herne mill, in line with the easternmost house at Herne bay, S. by W. ⅛ W.; West Girdler buoy, S.W. by W. ¾ W., distant one mile; Shivering sand buoy, W. by N. ½ N., $1\frac{6}{10}$ mile; Knob buoy, N.N.W. ¼ W., $1\frac{4}{10}$ mile; N.W. Shingles buoy, E. by N. ⅓ N., $\frac{7}{10}$ mile; and Girdler Elbow buoy, E. ½ S., $\frac{9}{10}$ mile.

BUOYS on N.E. side of Alexandra Channel.—Shingles Spit, conical buoy, *red*, marking the north side of Prince's channel, and described on page 264, also marks the north-east side of the entrance to Alexandra channel.

South Shingles, *red* cylinder, lies in $4\frac{3}{4}$ fathoms, N.W. by W., one mile from Shingles spit buoy; with Sarr mill, twice its height open of the west end of St. Nicholas wood, S. by W. ½ W.; Prince's channel light-vessel, W. ¼ S., distant $1\frac{1}{10}$ mile; N.E. Tongue buoy, S.E. by S., $1\frac{9}{10}$ mile; and North Tongue buoy, S.W., one mile.

S.W. Shingles, *red* cylinder, lies in $4\frac{3}{4}$ fathoms; with Birchington west mill, on with the west end of Cleve wood, bearing S. ½ E.; Prince's channel light-vessel, S. by W. ½ W., distant 8 cables; and Shingles Elbow buoy, W.N.W., 9 cables.

Shingles Elbow, a *red* cylinder, lies in $5\frac{1}{4}$ fathoms; with Pan-sand beacon, a little open west of the clock tower at Herne bay, bearing S.W. by S.; Prince's channel light-vessel, S.S.E. ½ E., distant $1\frac{3}{10}$ mile; and N.E. Girdler buoy, S.W. by W. ½ W., 4 cables.

West Shingles, a *red* cylinder, lies in $4\frac{1}{2}$ fathoms; with Girdler beacon, twice its height open east of Powell's belfry near Birchington,

bearing S. by E. $\frac{1}{4}$ E.; N.W. Shingles buoy, N.W. by W. $\frac{3}{4}$ W., distant 8 cables; and N.E. Girdler buoy, S.S.E. $\frac{1}{2}$ E., 6 cables.

N.W. Shingles, *red* conical buoy, with staff and globe, lies in 7 fathoms, at the south-west spit of the East Girdler; with Ash church, just open to the westward of Sarr mill, bearing South; and North Foreland lighthouse, in line with Girdler beacon, S.E. $\frac{2}{3}$ S.; North Girdler buoy, W. by S. $\frac{1}{3}$ S., distant $\frac{7}{10}$ mile; Shivering sand buoy, W. $\frac{2}{3}$ N., $2\frac{1}{4}$ miles; East Oaze buoy, N.W. by W. $\frac{7}{8}$ W., $4\frac{1}{10}$ miles; Knob buoy, N.W. $\frac{1}{3}$ W., $1\frac{7}{10}$ mile; West Shingles buoy, S. E. by E. $\frac{3}{4}$ E., $\frac{8}{10}$ mile; and Girdler Elbow buoy, S.S.E. $\frac{1}{2}$ E., $\frac{4}{10}$ mile.

BULLOCK CHANNEL, between the south-west end of Long sand and the East Girdler, has been gradually increasing in capacity for some years, until it has become by far the most capacious of the eastern channels into the Thames, being nearly one mile wide, and 6 to 9 fathoms deep. As, however, it is an indirect approach, and unbuoyed, no additional reference to it is needed.

OAZE DEEP is formed between Shivering and Red sands, Spile, and East Cant shoals to the southward, and Oaze sand to the northward. It is $1\frac{1}{4}$ mile wide at the eastern entrance, but narrows to half a mile to the westward, and the depths in mid-channel are from 7 to 11 fathoms at low-water. This is a more direct passage to the Nore than Knob channel, and, since it has been buoyed, has almost superseded the latter by day.

SHIVERING SAND has its eastern extremity, (which is marked by a large *bell* buoy, painted in *black* and *white vertical stripes*, with staff and cage, in $3\frac{1}{2}$ fathoms,) one mile to the north-west of the west end of the Girdler; it is, practically, a continuation of Red sand, but its ridge is separated from that of the latter sand by a narrow swashway; its width is half a mile, and the depth upon it has increased to 18 feet.

RED SAND and SPILE occur in continuation of Shivering sand for more than 6 miles, to where they meet Four-Fathoms channel, and where the Spile *black* buoy (described on page 256) is placed. Red sand dries about the middle; the Spile has one foot over it.

Buoys.—A *black* and *white vertically striped* can buoy lies at the east end, and a *black* and *white chequered* can buoy off the north side, of Red sand; and a *black* and *white vertically striped* can buoy to the north-east of the Spile.

EAST CANT, or Cant-edge shoal, lies on the extreme outer edge of the southern flat, and has a narrow patch with only 5 feet upon it. A *chequered black* and *white* can buoy marks its north side.

OAZE is a sand-bank lying nearly parallel to Red sand, and between Oaze and Barrow deeps. It is 4 miles long, from depths of 4 fathoms at

each end, by half a mile wide; and depths of 4 to 6 feet prevail over a space of $1\frac{1}{4}$ mile.

Buoys.—A *black* and *white horizontally striped* buoy, *lighted* by gas,* on the eastern extremity; a *black* and *white horizontally striped* conical buoy with staff and triangle on the west end; a *black* and *white vertically striped* can buoy on the north side; and a *black* can buoy nearly midway along the southern side, mark the limits of this shoal.

BUOYS on South Side of Oaze Deep.—Shivering Sand.—The eastern extremity of the 18 feet patch of Shivering sand is marked by a bell buoy, *striped vertically black* and *white*, with beacon cage, in $3\frac{1}{2}$ fathoms; with the highest part of Leysdown trees, bearing S.W. by W. $\frac{3}{4}$ W.; and Whitstable high mill, in line with the east coke chimney, S.W. by S.; Red sand buoy, W. $\frac{1}{4}$ S., distant $2\frac{3}{10}$ miles; East Oaze buoy, N.W. $\frac{1}{4}$ W., 2 miles; North Knob buoy, N. $\frac{1}{4}$ E., $1\frac{7}{10}$ mile; Girdler Elbow buoy, E. by S. $\frac{1}{4}$ S., $2\frac{4}{10}$ miles; West Girdler buoy, S.E. $\frac{7}{8}$ S., $1\frac{1}{10}$ mile; and Girdler light-vessel, S. by E. $\frac{7}{8}$ E., $1\frac{6}{10}$ mile.

East Red Sand, a can buoy, *striped vertically black* and *white*, lies at the east end of Red sand, in 22 feet, with Sarr mill, just open westward of Reculver towers, bearing S. by E. $\frac{1}{4}$ E.; Shivering sand buoy, N.E. by E. $\frac{3}{4}$ E., distant $\frac{6}{10}$ mile; and Red sand buoy, W. $\frac{1}{2}$ N., $1\frac{7}{10}$ mile.

The three following buoys are upon the margin of the southern flats upon which their several shoals are based.

Red Sand, a *chequered black* and *white* can, lies in $3\frac{3}{4}$ fathoms, to the northward of the dry portion of Red sand; with Margate mills, their apparent width open to the southward of Margate new church, bearing S.E. $\frac{1}{3}$ E.; and Whitstable low mill, showing between the coke chimneys, S. by W. $\frac{3}{4}$ W.; East Spile buoy, W. $\frac{1}{4}$ S., distant $2\frac{1}{2}$ miles; and Shivering sand buoy, E. $\frac{1}{4}$ N., $2\frac{2}{10}$ miles.

East Spile, a *black* and *white vertically striped* can, lies in $3\frac{1}{4}$ fathoms, to the north-eastward of the east end of the Spile; with Southchurch spire, open of the east end of Shoebury coast-guard station, bearing N.W. $\frac{1}{8}$ W.; and a conspicuous clump of trees in the background, in line with Leysdown church, S.W.; Cant buoy, W. by N. $\frac{3}{4}$ N., distant $2\frac{4}{10}$ miles; and Red sand buoy, E. $\frac{1}{4}$ N., $2\frac{1}{2}$ miles.

Cant Buoy, *chequered black* and *white*, has been described on page 243.

BUOYS on North Side of Oaze Deep.—East Oaze, *black* and *white horizontally striped* buoy, *lighted* by gas,* lies in

* **Caution.**—The Trinity House, London, has given notice, dated 3rd February 1882, that East Oaze buoy, since its illumination with *gas*, has been several times damaged by collision or otherwise, whereby the light has been extinguished, to the great detriment of

20 feet on the eastern extremity of the Oaze; with Sarr mill, one-third the distance from George's farm to Reculvers, bearing S. by E. $\frac{2}{3}$ E.; Herne high mill, appearing just to the westward of the clock-tower at Herne bay, S. $\frac{1}{3}$ E.; Middle Oaze buoy, W. by S., distant 2 miles; Mouse light-vessel, N.W. $\frac{3}{4}$ N., $1\frac{7}{10}$ mile; North Knob buoy, E. by N., $1\frac{6}{10}$ mile; Knob buoy, E. by S. $\frac{1}{8}$ S., $2\frac{1}{2}$ miles; and Shivering sand buoy, S.E. $\frac{1}{4}$ E., 2 miles.

Middle Oaze, a *black* can, is moored in 21 feet, close to the south side of a patch of 4 feet, the shoalest part of the bank. From the buoy, the west side of Cleve wood appears in line with the middle of Lower Hale grove, bearing S.E. by S.; a clump of trees on the back land, just to the right of Sheerness dockyard chapel, W. $\frac{1}{3}$ S.; West Oaze buoy, W. $\frac{7}{8}$ S., distant $1\frac{9}{10}$ mile; and East Oaze buoy, E. by N., 2 miles.

West Oaze, conical buoy, *striped horizontally black* and *white*, with staff and triangle, has been described on page 243.

KNOB CHANNEL is between the east extremities of Shivering and Oaze sands to the southward and westward, Knob shoals to the eastward, and the tail of Mouse sand to the northward, where it enters Barrow deep, from whence a direct course leads to the Nore. This channel is nearly always used at night, when Mouse light forms a good point of arrival and departure.

KNOB SHOAL lies to the north-east, $1\frac{1}{4}$ mile from the east end of Shivering sand. The least water upon the Knob is 17 feet; it is of irregular form, several projections extending for about half a mile from it, with depths varying from 24 to 30 feet upon them. A narrow 17-feet ridge also exists $\frac{3}{4}$ mile to the eastward of the Knob.

Buoy.—A *black* cylinder is placed in 19 feet on the south-western edge of Knob shoal; with Ash church, appearing nearly midway between Sarr mill and Reculvers, bearing S. $\frac{2}{3}$ E.; and Margate mills, one-third the distance from Northdown tower towards Reading Street beacon, S.E. $\frac{3}{4}$ S.; East Oaze buoy, W. by N. $\frac{1}{8}$ N., distant $2\frac{1}{2}$ miles; North Knob buoy, N.W. $\frac{1}{4}$ W., $1\frac{1}{4}$ mile; and N.W. Shingles buoy, S.E. $\frac{1}{3}$ E., $1\frac{7}{10}$ mile.

NORTH KNOB is a shoal of comparatively recent formation, with 9 feet over its eastern end, and 17 feet over its centre, and from thence curving to the W.N.W.; its whole length being 3 miles.

Buoy.—The western end of the shallow central portion of North Knob is marked by a *black* cylinder, in 24 feet; with Northdown tower,

navigation by night. Mariners are also cautioned, that many fishing vessels anchor in the vicinity of this buoy and show a single white light, so that the *gas* buoy must only be used as a collateral aid, and it is still necessary to adhere to the Sailing Directions, especially when passing at night between Princes channel and Mouse light-vessel.

appearing between Margate church and mills, bearing S.E. ¾ S.; and Powell's belfry and Pan-sand beacon nearly in line, S.S.E. ½ E.; Shivering sand buoy, S. ¼ W., distant 1$\frac{7}{10}$ mile; East Oaze buoy, W. by S., 1$\frac{7}{10}$ mile; and Mouse light-vessel, W.N.W., 2$\frac{7}{10}$ miles.

Mouse sand and light-vessel, with the buoys on the south side of the navigation from thence to the Nore, and Nore light-vessel, have been described on pages 241–243.

ANCHORAGES. — In the space contained in the channels described in this section, it is customary in moderate weather for vessels to anchor in any position to await the tide; the following anchorages, however, are those usually occupied :—

Queen's Channel.—At half a mile to the southward of the Wedge buoy shelter will be afforded by Margate sand in southerly winds.

Pan-Sand Hole.—There is anchorage in 30 to 33 feet midway between Pan-sand beacon and South Knoll buoy. Vessels drawing 24 feet should anchor between the Wedge and Pan Patch buoys, and not to the north-westward of South Knoll buoy. This was formerly the anchorage for large ships waiting for sufficiently high tides to admit of their crossing the Flats, but since the opening of Prince's channel it has not been required for that purpose.

Prince's Channel.—The best anchorage is between Girdler beacon and the north-west part of Pan sand, where the sands afford much shelter when the tide is low and the sea breaks upon them. A vessel anchoring at one-quarter of a mile or more to the E.S.E. of North Pan-sand buoy, should remain until Pan sand is covered, when there will be a depth of 19 feet through the north-west portion of the channel.

The Knob anchorage is a space to the northward of the Girdler and eastward of Shivering sand buoy, and is the proper anchorage for vessels detained by want of water to cross the Flats, set of tide, or other circumstances. Westerly gales are severely felt here, and should a vessel part her cables, it will be advisable to anchor under the dry patches of the Girdler, as affording the best shelter.

The Warp is a narrow bank of 6 fathoms, East 3½ miles from Nore light-vessel, and commonly used as an anchorage.

Directions for Queen's Channel and over the Flats.—Being off the North Foreland outside the Elbow buoy, steer N. by W. ¾ W., for 6 miles, to sight the East buoy of Margate sand, allowing for the tidal stream setting abeam; should there be any difficulty in sighting the buoy, or if it be gone, be careful to keep North Foreland light-house open to the eastward of Neptune tower, bearing S. by W., until the water deepens to 9 fathoms, or N.E. Spit buoy has been passed three-quarters of a mile,

when Queen's channel will be open. From this, a W. by N. westerly course for 8 miles leads through Queen's channel to about one-third of a mile south of Pan Patch buoy, passing one-third of a mile to the northward of Margate North Spit buoy, more than half a mile to the northward of Wedge buoy, and nearly the same distance to the southward of West Tongue buoy. From abreast Pan Patch buoy, the course through Pan-sand Hole to West Pan-sand buoy, is W. by N. $\frac{3}{4}$ N., and the distance about $2\frac{1}{4}$ miles; Pan-sand Spit buoy and beacon being to the northward, and South Knoll buoy to the southward. Now steer N. by W. $\frac{3}{4}$ W. westerly, making allowance for the cross stream, for $2\frac{1}{4}$ miles over the Flats, to abreast Girdler light-vessel, observing that in this track there is an average depth of only 13 to 14 feet.

If bound to the East Swale from Queen's channel, a course according to position must be shaped for Whitstable Street buoy, which, from the neighbourhood of Pan-sand east buoys, would be about W. by S. $\frac{1}{8}$ S., and the distance 7 miles, and when the Street buoy has been sighted proceed by the directions on page 258.

Directions for Prince's Channel.—Having arrived at the entrance to Queen's channel off N.E. Spit buoy, as already directed, steer N.W. by W. $\frac{1}{2}$ W., allowing for the tide-set, for Tongue light-vessel, distant about $3\frac{3}{4}$ miles, leaving East Tongue buoy 3 cables on the port hand. Pass to the northward of Tongue light-vessel: thence a W. by N. $\frac{1}{2}$ N. course for 5 miles, keeping Prince's channel light-vessel on the starboard bow in proceeding towards her, will lead through the channel to between Girdler beacon and N.E. Pan-sand buoy, from which position W. by N. $\frac{3}{4}$ N. $2\frac{3}{4}$ miles are the course and distance for Girdler light-vessel, the track passing about 3 cables to the south-westward of South Girdler buoy. Girdler light-vessel should be approached so as to be passed on her north side, between the vessel and West Girdler buoy, where there is the deepest water, and which will clear the 17-feet patch lying to the westward of her.

CAUTION.—In shaping a course from Tongue light-vessel through Prince's channel on the last of the ebb, or during the first-quarter flood, care must be taken to allow for a tidal stream setting to the southward.

Directions for Alexandra Channel.—As remarked on page 265, Alexandra channel offers the advantage of a nearly straight course between Tongue and Mouse light-vessels, but not being lighted, it is not available for night navigation. Having passed to the northward of Tongue light-vessel, steer W.N.W. westerly, about $1\frac{1}{4}$ mile for Prince's channel light-vessel, or until Shingles beacon bears N.N.W. $\frac{2}{3}$ W., when a N.W. by W. $\frac{1}{4}$ W. course for $5\frac{1}{2}$ miles will lead through Alexandra channel between the *red* buoys of the Shingles to the north-eastward, and the *red*

and *white striped* Girdler buoys to the south-westward, to abreast North-west Shingles beacon buoy; when, about the same course continued for 4½ miles farther, will carry through Knob channel to a position from whence a course up the West Swin may be shaped. As before observed, Alexandra channel is too narrow for a vessel of burden to work in.

Directions from the Girdler to the Nore, through Oaze Deep.—The course from Girdler light-vessel to round Shivering sand buoy is N. ¾ W., and the distance to be run 1¼ mile, making due allowance for a tide stream setting abeam. From abreast Shivering sand buoy, steer W. ¼ N. for 5⅞ miles, which will lead through Oaze deep to one-quarter of a mile south of West Oaze buoy; then steer W. by N. ½ N. for the Nore, passing to the northward of Cant buoy.

At night, when rounding the west spit of the Girdler and east extremity of Shivering sand, Maplin light, which in all other directions shows *red*, will in this direction, or between the bearings N. ¼ E. and N. ⅛ E., be seen *white*, as described on page 240; consequently, neither of these shoals should be approached so near as to change the colour of the light to *red*.

Through Knob Channel.—From abreast Shivering sand buoy, steer about N.W. for 2 miles in the direction of Mouse light-vessel, to abreast East Oaze buoy,* allowing for the stream setting nearly abeam. A vessel in this track will pass one mile to the south-westward of the two buoys on Knob shoals, and in working they will serve her as a guide when to tack. Having passed East Oaze buoy, continue on the same course toward Mouse light-vessel for three-quarters of a mile farther, when the fairway will be reached, and a West (southerly) course for 8 miles will lead to the Nore light-vessel. If the wind be south-west, and it should be desirable to keep to windward, haul up as soon as the water deepens to the northward of East Oaze buoy, when W. ¼ N. will clear the sand; which is marked on its north side by a *black* and *white vertically striped* can buoy.

From the Nore outwards by Knob Channel.—Being one-quarter of a mile or less to the northward of Nore light-vessel, steer East for the fairway between Mouse light-vessel and East Oaze buoy. When Mouse light-vessel bears N.W. westerly, proceed with it on that bearing and with Girdler light-vessel broad on the starboard bow, passing to the eastward of East Oaze and Shivering sand buoys, and when Girdler light-vessel bears S. ⅔ E., steer for, but pass to eastward of, her

At night, Maplin light appearing *white* will insure being clear to the eastward of Shivering sand, when Girdler light-vessel may be immediately steered for, keeping within the limits of Maplin white light.

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* *See* foot-note, page 268.

Through Oaze Deep.—From abreast Nore light-vessel as before, an E. by S. $\frac{1}{2}$ S. course for $4\frac{3}{4}$ miles, allowing for the flood stream setting on the port bow, will lead north of Cant buoy to about one-quarter of a mile south of West Oaze buoy; thence the course through the deep is E. $\frac{1}{4}$ S., and the distance $5\frac{2}{3}$ miles, passing one and half cable to the northward of Shivering sand buoy, and when Girdler light-vessel bears S. $\frac{2}{3}$ E. steer so as to pass to the eastward of her.

Through Prince's Channel.—From between Girdler light-vessel and West Girdler buoy, steer an E. by S. $\frac{3}{4}$ S. southerly course for $2\frac{3}{4}$ miles, which will lead to between Girdler beacon and North-east Pan-sand buoy; then E. by S. $\frac{1}{2}$ S., 5 miles, leads through the fairway, passing one-quarter of a mile to the southward of Prince's channel light-vessel, to a position one and half cables to the north-eastward of Tongue light-vessel; from this steer S.E. by E. $\frac{1}{2}$ E. to clear the north-east spit of Margate sand, taking care to allow for the tidal stream, which on the flood sets towards the sand. When North Foreland lighthouse appears open to the eastward of Neptune tower bearing S. by W., a S. by E. $\frac{1}{4}$ E. easterly course will lead to the eastward of the Elbow buoy off the North Foreland, or a course may be shaped according to circumstances.

At night, on leaving Prince's channel, Tongue lights should not be brought to the northward of N.W. by W. $\frac{1}{4}$ W. until North Foreland light bears S. by W., on which bearing it must be remembered that the light changes from *white* to *red*, the eastern limit of the red light leading one cable eastward of East Margate buoy.

Over the Flats and down Queen's Channel.—From Girdler light-vessel, steer over the Flats S. by E. $\frac{3}{4}$ E. easterly, for $2\frac{1}{4}$ miles, allowing for the stream, to West Pan-sand buoy, then E. by S. $\frac{3}{4}$ S. about $2\frac{1}{4}$ miles through Pan-sand Hole to abreast Pan Patch buoy. From this, the fairway course through Queen's channel is E. by S. easterly, which will lead one-third of a mile to the northward of North Spit buoy, and about three-quarters of a mile to the north-eastward of North-east Spit buoy, when a S. by E. $\frac{1}{4}$ E. easterly course will clear the east spit of Margate sand, and lead to outside the Elbow buoy.

CAUTION.—If night is approaching when near the eastern part of Queen's channel, it is advisable to steer half a point to the eastward of the above track, and not to haul round Margate sand until North Foreland light bears S. by W. It must be remembered also that in this part of the channel the last of the ebb and first-quarter of the flood streams set between South and S.S.W.: allowance should therefore be made for them in light winds, or with scant easterly winds.

In working through either of the foregoing channels, a look-out for the buoys, beacons, and lights, with attention to their bearings and a judicious use of the lead, are the best directions, for the land is so distant that marks are, generally speaking, of little service.

TIDES.—It is high-water, full and change, at Pan-sand Hole, at 12h., and at the Nore at 1h. 35m. Off North Foreland the stream runs to the S.S.E. from about 2½ hours before, until 3½ hours after, high-water at *Margate*, and it commences running to the southward towards the Gull stream at about 2½ hours after high-water at Margate. Vessels should not leave *Margate* road to beat down until nearly half-ebb.

The first of the flood stream at the eastern end of Queen's and Prince's channels runs to the S.S.W., the first-quarter sets S.W., half-flood W.N.W., and for the last hour it sets to the N.W. The ebb begins setting to the N.E., and draws round to E.S.E. at half-ebb, and to S.S.E. and South in the last-quarter.

The general rate of the tidal streams is about 2½ knots during springs, and 1½ knot at neaps.

TABLE

SHOWING the Time of High Water on Full and Change Days, with the Rise of Tide at Springs and Neaps above the Low Water Level of Ordinary Springs, and the Range* at Neaps, at different places on the East Coast of England.

Place.	High Water, Full and Change.	Rise.		Range at Neaps.	Place.	High Water, Full and Change.	Rise.		Range at Neaps.
		Springs.	Neaps.				Springs.	Neaps.	
	h. m.	Ft.	Ft.	Ft.		h. m.	Ft.	Ft.	Ft.
Berwick	2 18	15	11½	8	Leman Shoal	6 0	—	—	—
Holy Island Harbour	2 30	15	11½	8	Ower Shoal	6 30	—	—	—
North Sunderland	2 30	15	11½	8	Hammond Knoll	7 40	—	—	—
Coquet Road	3 0	14½	11	7½	Winterton Ridge	7 50	—	—	—
Blyth	3 15	15	11	7	Yarmouth Road	9 15	6	4½	3
Tyne River Entrance	3 20	14¾	11¼	8	—, Haven, Brush	—	5¾	4¾	2¾
—, North Shields	3 23	14½	11¼	8½	—, Bridge	—	5	4	3
—, Newcastle	3 35	15	—	9	Lowestoft	9 57	6½	5¼	4¼
—, Elswick	—	15½	—	9⅝	Blyth River, Southwold	10 20	6½	4½	2½
Sunderland	3 22	14½	11	7¾	Kentish Knock	11 47	—	—	—
Seaham	3 24	14½	10½	6½	Orfordness	11 15	8	6½	5
Hartlepool	3 28	15	11¾	8	Orford Haven Bar	11 30	7½	—	—
Tees River Bar	3 45	15	12¼	—	—, Quay	0 30	7½	—	—
—, Middlesborough	3 55	13	10¼	—	—, Slaughden	1 00	7½	—	—
—, Stockton	4 25	11½	8½	—	—, Snape Bridge	3 00	6	—	—
Whitby	3 45	15	11½	8	Woodbridge Haven Bar	11 45	12	9	—
Scarborough	4 11	15¼	12½	8¼	——, Kingston Quay	0 35	10	—	—
Filey Bay	4 20	16	12½	9	——, Wilford Bridge	0 55	7	—	—
Bridlington	4 39	16	12	8	Harwich Harbour	0 6	11½	9¾	8
Humber River, Spurn Point.	5 26	18¾	15	10¾	Orwell River, Pinmill	0 20	12	—	—
—, Grimsby	5 36	19½	15¼	11	—, Downham Reach	0 27	12	—	—
—, Killingholme	6 2	19¾	15¾	11⅛	—, Ipswich	0 35	13½	—	—
—, Hull	6 29	20¾	16½	11⅝	Stour River, Wrabness	0 29	12	—	—
—, Ouse River, Goole	7 26	13½	—	9	—, Mistley Quay	0 48	11¾	—	—
Boston Deep, Clay Hole	—	23½	—	9¼	—, Cattawade Bridge	1 8	4½	—	—
—, Boston	7 0	13¼	—	6	Colne River, Colne Point	12 00	14	10	6
Lynn Deep, Long Sand	6 0	23	—	—	—, Wivenhoe	0 10	15	10	6
—, Lynn Road	—	23¼	—	—	Blackwater River, Sales Point.	12 00	14¾	10	5¼
—, Lynn	—	22½	—	—	—, Heybridge	0 20	12	8	4
Sutton Bridge	—	20½	—	—	Chelmer River, Maldon	0 32	10	6	2
Wisbech	7 30	15¼	—	—	Gunfleet Sand, N.E. end	11 40	12	8	4
Cromer	7 0	14¾	11	7½	Crouch River, Foulness	0 5	14½	10½	7
Blakeney Bar	6 30	15	—	—	—, Hull Bridge	0 25	16	11	6
Blakeney	—	9	—	—	Nore	0 30	15½	13	11½
Cley	—	5½	—	—	Margate	11 40	15½	13	10½
Wells Bar	6 20	18	—	—	Pansand Hole	12 00	15½	13	10½
Wells	7 0	12	—	—					

* The range is considered to be the rise of any tide from its low water level to its high water level.

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